DOCUMENT RESUME

ED 120 417	CE 006 653

AUTHOR	Thal-Larsen, Margaret; Parrish, Gerald R.
TITLE	Career Guidance for Science Students: Systems, Practices and Data Base.
INSTITUTION	Management Technology, Berkeley, Calif.
SPONS AGENCY	National Science Foundation, Washington, D.C. Office of Experimental Projects and Programs.
PUB DATE	75
NOTE	265p.
EDRS PRICE	MF-$0.83 HC-$14.05 Plus Postage
DESCRIPTORS	Career Choice; Career Education; Career Planning; Computer Oriented Programs; Counseling Effectiveness; Counseling Programs; Counseling Services; Counseling Theories; Guidance Programs; Guidance Services; High School Students; Information Needs; Information Systems; Labor Market; *National Surveys; *Occupational Guidance; *Science Careers; *State of the Art Reviews; *Vocational Counseling; Vocational Development
IDENTIFIERS	*Career Guidance; Counseling Materials; National Science Foundation

ABSTRACT

The report, prepared to help the National Science Foundation determine the actions it should undertake to improve career guidance for future science majors, describes the current major theories and practices of career guidance; reviews career guidance materials in the sciences; summarizes what others are doing or contemplating; and recommends what should be done to develop effective and useful career guidance material in the sciences, including the information to be collected, delivery methods, and costs. Among the study's findings, obtained through surveys of secondary sources, visits to systems, State and Federal agencies, and interviewing and questionnairing of knowledgeable persons, are these: a lifelong career development model is replacing static conceptualizations of career choice; secondary students seem to desire various types of direct job experience; and two new practices consonant with developmental theories, career education and the computerized career guidance system, are emerging to supplement counselors' efforts. Thirty-three recommendations emphasize specific research needs and urge Foundation cooperation with other named agencies, particularly to improve the data base for a labor market information system. The recommendations reflect authorities' responses indicating that improving guidance materials and procedures for science students necessitates improving them for all. Appendixes include questionnaire returns, interview reports, and related documents. (AJ)

Documents acquired by ERIC include many informal unpublished materials not available from other sources. ERIC makes every effort to obtain the best copy available. Nevertheless, items of marginal reproducibility are often encountered and this affects the quality of the microfiche and hardcopy reproductions ERIC makes available via the ERIC Document Reproduction Service (EDRS). EDRS is not responsible for the quality of the original document. Reproductions supplied by EDRS are the best that can be made from the original.

ED120417

MAR 15 1976

U.S. DEPARTMENT OF HEALTH.
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

CAREER GUIDANCE FOR SCIENCE STUDENTS: SYSTEMS, PRACTICES AND DATA BASE

by

Margaret Thal-Larsen
and
Gerald R. Parrish

December 1975

This report was prepared for the Office of Experimental Projects and Programs, Directorate for Science Education, National Science Foundation under Grant Number EPP74-20284. Since contractors performing research under Government sponsorship are encouraged to express their own judgment freely, the report does not necessarily represent the Foundation's official opinion or policy. Moreover, the grantee is solely responsible for the factual accuracy of all material developed in the report.

CE 006653

EXECUTIVE SUMMARY

of

Report to the National Science Foundation under Grant No. EPP-74-20284

on

CAREER GUIDANCE FOR SCIENCE STUDENTS: SYSTEMS, PRACTICES AND DATA BASE

I. Purpose of Report and Research Objectives

The purpose of the present report was described as follows in the Project Summary initiating this study:

> *"The Education Directorate of NSF will use the document as an aid in its assessment of the current status of Career Guidance and to enable it to better determine the appropriate priority of actions it should undertake to improve the effectiveness of Career Guidance for future science majors."*

In correspondence with a representative of the Foundation prior to our receipt of a grant to undertake this study, the objectives of our research were spelled out as listed below:

1. *Give an overview summary of the current major theories of Career Guidance, stressing implications for action;*
2. *Give an overview of current practices in Career Guidance all the way from the school with no counselor to the sophisticated computer-based systems;*
3. *Review what has been done and is now available concerning Career Guidance materials in the sciences;*
4. *Summarize what others are doing or are contemplating;*
5. *Provide recommendations based on findings as to what should be done to develop effective and useful Career Guidance materials in the sciences including the information to be collected, delivery methods and costs.*

II. Research Methodology

The Project Summary also outlined the methodology to be employed in this research.

> *"Surveys of secondary sources, visits to systems, State and Federal Agencies, interviews with knowledgeable persons and updating, where possible, of existing data"*

The above sources were extensively utilized resulting in some updating of existing data.

As these suggestions were followed, we found it expeditious, in addition, to resort to questionnairing State School Superintendents, Research Chiefs of Employment Security Agencies, Commercial and Professional Society publishers of occupational materials, State Career Education Directors and Career Education Project Directors. We also referred to questionnaire data from school counselors and other school personnel as well as from students, obtained in earlier studies with which we were associated.

III. Identifying and Addressing the Questions

Because of the scope of this study, assembling the information required presented far fewer difficulties than organizing the miscellany of data obtained into a coherent whole and detecting the patterns and interrelationships that might guide the structuring of this whole.

The task of presenting a broad overview of current theories and practices of Career Guidance upon which can be based an assessment of the problems to be resolved and the actions to be undertaken can be construed as finding the answers to certain broad questions implicit in this research objective.

1. What theories underlie the Career Guidance provided students?
2. What Career Guidance do students want?
3. What Career Guidance do students receive?
4. Based on findings respecting the foregoing, to what areas could the National Science Foundation devote attention or afford support in order to improve the Career Guidance provided to future science majors?

As to the first question, our forays into the field of career development theory led us to the conclusion that the older and relatively static conceptualizations concerning career choice are fast losing out to newer and more dynamic constructs. These view career development as a lifelong process with the completion of specific developmental tasks at definable stages required if the appropriate degree of vocational maturity is to be achieved as these stages are reached.

One of these tasks is choosing an initial occupation. To do so requires not only initiative and certain skills but also self awareness and a career awareness based upon sound, usable information.

As to our second question about the guidance that is wanted, very few hard data exist on the kinds of help students wish to receive from their high schools during the developmental process. Nonetheless, what little information is available suggests that at this stage their prime need is for help in planning their careers. The even smaller amount of knowledge we have as to the career information content students desire and the means of its delivery indicates that they most want various types of direct experience enabling them to acquire a great multiplicity of detailed data about various jobs.

As to our third question concerning the guidance students receive, a panoramic view of the tremendous range of guidance practices now extant reveals a still considerable predisposition to place the major burden of Career Guidance upon the hard-pressed counselor whose role is ill-defined. Despite the expressed priority of students for help with their career planning, the major portion of the counselor's time goes to other than vocational counseling. And no human head can hold the detailed mass of educational and occupational information now needed to support informed Career Guidance.

However, two relatively new "practices" are emerging, both consonant with developmental theory and both having a potential for supplementing the counselor's efforts. One is Career Education which is an infusion into both education and guidance of certain developmental concepts and procedures that more nearly match the students' desires for help with their career planning. The other is the computerized Career Guidance system which can store and make readily retrievable a volume of Educational and Occupational Information beyond the capacity of any human counselor to retain and deliver.

> But as we survey these new "practices" other series of questions arise that are variously considered in the content of our report and which must be addressed before an answer to our fourth question concerning what actions should be undertaken can even be considered. These include such questions as:

5. What can we learn from examples of the application of Career Education concepts and practices that has relevance for the Career Guidance of specific high school populations such as students with strong capabilities for pursuing careers in science, mathematics or technology?

6. To what extent can we compare the impact of the different computerized guidance systems now operative upon different types of students, given these systems' different approaches to solving the problem of access to data and the differences in the information that is stored and can be retrieved?

7. Considering the fact that, quite suddenly, the means of information delivery are greatly out-stripping our capabilities for producing the sound, localized career information that is wanted and also our ability to effect the kind of administrative arrangements permitting its production and dissemination, are we in danger of computerizing chaos? And if so, how can we achieve a better data base for these systems as well as improve the setting in which they are to function?

And there are other and more basic issues that remain unresolved. These include:

8. Is the present climate of opinion conducive to giving special career attention to science students?

9. Are the systems now producing and delivering career information or providing guidance so complex that in order to improve the Career Guidance given science students, it is necessary to improve that provided to all students?

10. Given the range of these problems, what actions can the National Science Foundation take in order to answer such questions as those above in a cost effective manner, and in so doing, give attention to the appropriate priorities of action?

Our recommendations for National Science Foundation action that follow contain an element of hope that any of these actions, if undertaken may help to answer our fourth question which embodies this study's purpose--to assist in determining ways to improve the effectiveness of Career Guidance for science students.

IV. Recommendations

Many of the thirty three recommendations for National Science Foundation action, detailed in the project report and designed either to improve Career Guidance in general or, more specifically, that provided to future science majors, have been affected in their formulation by two considerations:

First, that until quite recently there has been little appreciation of the concept of a comprehensive labor market information system. Such a system would include as one of its components a career information system designed to rationalize the collection, production and dissemination of this huge and complex body of information in usable form.

To serve as a reliable data base for Career Guidance, information must be accurate, timely and detailed. And to meet these criteria, Career Information requires for its production and dissemination the coordinated effort of many agencies and organizations, both public and private and at their several levels. Hence, many of the recommendations, in the interests both of efficiency and of cost effectiveness, propose joint action on the part of the Foundation rather than its individual initiatives. Further, contacts by the Foundation at certain focal points are suggested in order to profit from the multiplier effect such contacts could produce.

Secondly, the body of empirical data that would substantiate or refute the various theories of career development in whole or in part, and support or not support a variety of guidance practices, is notably slim. Both the expanding implementation of Career Education concepts and the rapid proliferation of computerized Career Guidance systems give promise of providing opportunities to obtain generous amounts of significant data regarding the outcomes of various guidance approaches and procedures. These opportunities should be seized whenever feasible to determine the most effective means of providing Career Guidance to any constituency including future science majors in which the National Science Foundation has an especial interest.

Our recommendations can be categorized under six major headings:

1. Investigations designed to learn what Career Guidance future science majors at the secondary school level want to receive including their preferences as to the content of career information and the means by which it is delivered and, subsequently, actions directed to evaluating the outcomes of following these students' wishes and preferences.

2. National Science Foundation support for research either under its own aegis or through participation in the research efforts of others, directed to resolving certain unresolved questions concerning the theoretical underpinnings of Career Guidance practices. Study of those external events, influences, and environmental factors as well as achievements that shape personal orientation in particular career directions; or investigations attempting to substantiate with empirical data linkages assumed to exist between certain constructs and specific occupations will serve as examples of the research recommended.

3. Research designed to establish with far greater precision than is now the case the present status of various guidance practices, including their prevalence and the identification as to which are declining while others are emerging; and action, following this research, to determine the efficacy of certain innovative practices in the Career Guidance of science students as well as attempts to modify more general facets of guidance practice that may be found wanting.

4. An assessment by National Science Foundation of the potential of Career Education concepts and practices for improving the guidance provided to students interested in careers based in science and technology. Along with this assessment, active participation in projects designed to develop appropriate learning experiences, including instructional modules and exploratory work experiences for such students, and to test these procedures for their efficacy in the guidance of future science majors.

5. An assessment of the comparative efficacy of various computerized Career Guidance systems through study of their outcomes with particular reference to their effects upon different populations of users including science students, and with reference to their different access strategies and settings and to cost and performance comparisons.

   The design and present status of various systems now or soon to be operational are providing a unique opportunity at the present time to obtain empirical data not hitherto available for comparative study of various aspects of computerized guidance and its impact. These opportunities should be grasped sooner rather than later to maximize the utility of such findings as can be obtained.

6. Joint action by National Science Foundation and other named agencies and organizations and, in particular, contacts by the Foundation at various focal points in the labor market information system to improve the data base supporting both Career Guidance in general and the guidance that can be provided to future science majors. Specific recommendations are made respecting the data development connected with estimates of employment, labor demand and labor supply by occupation, together with their projection into the future, and the manner of presenting this information.

   In particular, the Foundation is urged to coordinate its activities with the National Occupational Information Service of the U.S. Department of Labor in the interests not only of increasing that organization's considerable potential to improve the production and dissemination of Career Information in general, but also of facilitating the Foundation's efforts to improve the body of information having particular utility for its own constituency.

A final recommendation speaks to the point of the Foundation's exploring current attitudes in the guidance profession respecting special career attention for science students and gathering the factual data required to affect negative attitudes where they exist.

CAREER GUIDANCE FOR SCIENCE STUDENTS: SYSTEMS, PRACTICES AND DATA BASE

by

Margaret Thal-Larsen
and
Gerald R. Parrish

December 1975

This report was prepared for the Office of Experimental Projects and Programs, Directorate for Science Education, National Science Foundation under Grant Number EPP74-20284. Since contractors performing research under Government sponsorship are encouraged to express their own judgment freely, the report does not necessarily represent the Foundation's official opinion or policy. Moreover, the grantee is solely responsible for the factual accuracy of all material developed in the report.

Management Technology: Career Projects
2063 Center Street, Berkeley, California

TABLE OF CONTENTS

Acknowledgments vii

INTRODUCTION

Chapter I: Report Objectives, Methodology and Definitions

1. Purpose of Report, Research Objectives and Methodology 1
2. Research Methods Employed 1
3. Interviews with Knowledgeable Persons 2
4. The Matter of Definitions 3
5. Framing the Recommendations 7
6. Conclusion 9
References (Chapter I) 11

WHAT THEORIES OR PRINCIPLES UNDERLIE THE CAREER GUIDANCE PROVIDED STUDENTS?

Chapter II: Theories and Principles

1. Introduction 13
2. A Substructure of Theory for Guidance Practice 13
3. A Classification of Theories 15
4. Trait-factor Theory 16
5. Sociology and Career Choice Theory 17
6. Self-Concept and Developmental Theory 18
7. Vocational Choice and Personality Theory 20
8. General Implications of Theory for Career Guidance Practitioners and for Guidance Systems 21
9. Indications of the Nature of Future Guidance Practice 22
10. Theory and the Design of Computerized Guidance Systems 24
11. Conclusion 27
References (Chapter II) 29

WHAT CAREER GUIDANCE DO STUDENTS WANT?

Chapter III: Students and Career Guidance

1. Introduction 33
2. Assessing the Career Development of American Youth 33
3. Student Opinion on Career Information and its Delivery 35
4. Conclusion 38

References (Chapter III). 39

WHAT CAREER GUIDANCE DO STUDENTS RECEIVE?

Chapter IV: Overview of Career Guidance Practices and Materials

1. Introduction 41
2. Questionnairing State School Officials. 42
3. Questionnairing Research Chiefs of State Employment Security Agencies. 46
4. Delineation of Current Guidance Practices. 50
5. Conclusion 51

References (Chapter IV). 53

Chapter V: Counselor-Based Career Guidance

1. The Guidance Counselor 55
2. Case Studies of Guidance Practice 58
3. The Career Center 61
4. Teaching Decision-Making .63
5. Testing 64
6. Utilization of Community Resources 65
7. Conclusion 66

References (Chapter V) 69

Chapter VI: Career Education and Career Guidance

1. Introduction 71
2. Career Guidance as a "Subset of Career Education" 71
3. Career Education for Gifted and Talented Students 75
4. A "Small Survey" of Career Education Directors 77
5. Conclusion 79

References (Chapter VI). 81

Chapter VII: Computerized Career Guidance Systems

Introduction 83

1. The OIAS - Oregon's Occupational Information Access System 87
2. ECES - The Educational and Career Exploration System 105
3. GIS - The Guidance Information System 115
4. Philadelphia's VICS - The Vocational Information through Computer Systems 121
5. ETS' System of Interactive Guidance and Information 127
6. CVIS - The Computerized Vocational Information System 139
7. Project DISCOVER 145

Conclusion 148

References (Chapter VII) 151

Chapter VIII: Guidance and the Data Base

1. Introduction 155
2. Background and Status of Career Information 155
3. The Content of Career Information 158
4. The Production of Career Information for Career Guidance 162
5. Employment Data by Occupation 163

Chapter VIII (Continued)

6. Employment Projections by Occupation 165

7. Labor Demand/Supply Relationships 166

8. Presenting Information about Occupations 168

9. Conclusion 170

References (Chapter VIII). 171

WHAT CAN BE DONE TO IMPROVE THE EFFECTIVENESS OF CAREER GUIDANCE FOR FUTURE SCIENCE MAJORS?

Chapter IX: Recommendations

1. Introduction 173

2. Recommendations 174

3. Conclusion 183

References (Chapter IX) 185

APPENDICES

Chapter III III-1

Chapter IV

1. Returns from State School Officials' Questionnaire IV-1

2. Returns from State Employment Security Agency Research Chiefs' Questionnaire IV-11

Chapter V

1. Interview Report (Counselors) -- "X" High School V-1

2. Interview Report (Counselors) -- "Y" High School V-5

3. Conference Report: VIEW V-9

4. Site Visit Report -- Appalachia Educational Laboratory, Charleston, West Virginia V-15

Chapter VI

Returns from State Career Eduation Directors' Questionnaire VI-1

Chapter VII VII-1

Chapter VIII

1. Returns from Professional Societies' Questionnaire VIII-1
2. Returns from Commercial Publishers' Questionnaire VIII-3

Chapter IX - "What Others are Doing"

1. U.S. Department of Labor IX-1
2. U.S. Office of Education IX-4
3. The National Institute of Education IX-6

ACKNOWLEDGMENTS

This must be a dual acknowledgment.

First, we acknowledge freely what the expert will recognize immediately. This study was not conducted by members of the guidance profession. Rather, if was completed by "outsiders" whose areas of expertise are in such fields as the functioning of labor markets, labor market information systems, and the delivery of manpower-related services.

Second, because of this lay status in the guidance field it was necessary to rely upon the experts for their help. We acknowledge gratefully the large amount of assistance we have received from them in completing this study.

We question that our first admission reflects a situation that is "all bad." When a subject is as many-faceted as is Career Guidance, and one objective is to perceive interrelationships across a broad area, the required wide angle view may more readily be adopted by the observer having little facility with a microscope than by one who is schooled in its use.

As to our second admission, those who have shared their knowledge with us are too many to mention here by name. To lend substance to our acknowledgment of their help we have bent our every effort to conveying accurately their thinking on the improvement of Career Guidance--a subject to which they, themselves, have long given much thought.

Those who assisted us in our search for information were many. They included those who answered our questionnaires--state school officials, research chiefs of state employment security agencies, and individuals in professional societies and commerical publishing houses who prepare guidance materials. Officials in the Bureau of Labor Statistics and the Manpower Administration of the U.S. Department of Labor as well as in the U.S. Office of Education and the National Institute of Education took valuable time from crowded schedules to help us as did others in various private organizations. A particular vote of thanks must go to the developers and staff of the several guidance systems whose sites we visited and whose time we absorbed. To them and to our own colleagues we are grateful.

If we have failed adequately to convey the views expressed in what we have read, written by experts, and in what we have heard from other authorities, the fault lies not with our teachers but with their pupils.

INTRODUCTION

CHAPTER I: REPORT OBJECTIVES, METHODOLOGY and DEFINITIONS

Purpose of Report, Research Objectives and Methodology

As to the purpose of the present report, we quote the Project Summary accompanying the letter that initiated this project on November 7, 1974.

> *"The Education Directorate of NSF will use the document as an aid in its assessment of the current status of Career Guidance and to enable it to better determine the appropriate priority of actions it should undertake to improve the effectiveness of Career Guidance for future science majors."*

The research objectives of the study were earlier spelled out in correspondence between this writer and representatives of the Foundation. These objectives may be summarized as follows:

1. Give an overview summary of the current major theories of Career Guidance stressing implications for action
2. Give an overview of current practices in Career Guidance all the way from the school with no guidance counselor to the sophisticated computer-based systems
3. Review what has been done and is now available concerning Career Guidance materials in the sciences
4. Summarize what others are doing or are contemplating
5. Provide recommendations based on findings as to what should be done to develop effective and useful Career Guidance materials in the sciences including the information to be collected, delivery methods and costs.

The project summary also outlined the methodology to be employed in this investigation. These were described as, "Surveys of secondary sources, visits to systems, State and Federal Agencies, interviews with knowledgeable persons and updating, where possible, of existing data."

Research Methods Employed

Secondary sources and various other descriptive materials have, indeed, been employed in preparing the present study. As implied in the acknowledgments we are as indebted to the written as to the spoken word. We make no pretenses, however, of having exhausted or even systematically reviewed the enormous bibliography attaching to Career Guidance and its several specialties.

For an overview of general trends in the field and to profit from the outlooks of many of its experts, we turned to the two decennial volumes prepared under the aegis of the National Vocational Guidance Association--edited by Henry Borow (1) and by Edwin L. Herr (2).

For some understanding of developments in theory, we relied on a recent volume by Samuel H. Osipow (3) as well as upon several works of the theorists themselves. In seeking to obtain an overall perspective as to practice, we referred to the studies of Robert E. Campbell, et al (4) and of Lorraine Sundal Hansen (5). Many works, not general compendiums of practices but rather reports detailing developments in specific practices (6) or reports cataloguing innovative practices being tested experimentally or detailing the progress of various guidance initiatives (7) were consulted as needs for particular types of information arose.

When what was wanted were the views of a number of authorities on more general areas germane to this study we utilized volumes where a prime mover in that area had served as editor for the contributions of his colleagues (8), or special issues of professional journals, consolidating the seminal thinking of the time on particular subjects. (9)

Finally, we referred continually throughout the conduct of this study to a miscellany of conference notes, published speeches, research and evaluation findings, literature elucidating or extolling specific systems, and models of functioning or projected guidance programs.

Interviews with knowledgeable persons conducted in the course of this study proved, if anything, to be more productive in view of the investigation's purpose than our recourse to secondary and other written sources. For one thing, but little can be found in the literature that is directly in point for the population with which we are concerned--science students at the secondary school level. Moreover, very little has been done or is being thought about concerning this group's special needs or the special methods to be considered in improving the Career Guidance provided them. Face-to-face contacts affording an opportunity to discuss these matters with experts in guidance and in the preparation of guidance materials at least directed their attention to the legitimacy of pursuing this purpose and elicited a variety of suggestions for achieving it.

We were fortunate that at the national level the chiefs of various programs and services which taken together comprise the core of Career Guidance consented to see us. In large part our estimate of the priority order of needed action to improve guidance in general terms has been shaped by their opinions.

An important result of our visits to the sites of systems was to obtain hands-on experience in the use of several systems employing a variety of technologies for information delivery. Excellent as is much of the published material concerning these systems, it can not convey as insightful impressions of their workings as can on-site observation.

Further, the brief, overall accounts usually published about these systems cannot be expected to yield via the printed page, as can conversations with their developers, descriptions of the settings within which they function and details concerning their design and use having interest only for investigators who are largely oriented to specific aspects of the guidance they provide.

In attempting to "give an overview of current practices in Career Guidance all the way from the school with no guidance counselor to the sophisticated computer-based systems," we have been troubled throughout the conduct of this study by a largely unanswered question: To what extent is the thinking or the practice being described prevalent and therefore representative of general Career Guidance thinking and practice? This is not a question which the writers of secondary sources address or even speculate about. Nor is it one that can be answered accurately without large-scale surveys based on carefully considered sample designs. Yet its answer would give one measure--that of volume--in assessing the importance of various practices (and therefore the current status in terms of content and procedures) of Career Guidance. Its answer, in particular, would give us a more precise indication than we have now of the extent to which older, established practices still dominate as against newer practices or those gray areas between where the two are intermixed.

Without the resources to survey a representative sample of individual school counseling departments that would provide definitive answers to this inquiry, we utilized another research method. Questionnaires, (not originally contemplated for this study and not specified in the Project Summary) were directed to a higher level in the system. The State Superintendent of Schools could be asked to categorize as "most prevalent" certain practices as conducted in the many schools or school districts of his state in the absence of our asking the latter ourselves. But because of the decentralization characterizing the nation's school systems this technique, as expected, was of limited utility. It proved successful, and then only moderately so, for not more than half of the states. The responses received nevertheless fall into patterns and exhibit regularities that encourage some generalizations concerning the omnipresence or its lack, of some practices across the wide spectrum of situations in which guidance is provided.

Other questionnaires respecting the current status of the art in the preparation and use of materials for Career Guidance yielded responses which because of their comprehensiveness of coverage can serve as a basis for valid inferences.

In judging the importance of a given practice in as rapidly changing a field as Career Guidance, it can be as significant properly to assess the place on the evolutionary time frame that is occupied by this practice as to determine its ubiquity. As implied above, various secondary sources have been most helpful in alerting us to trends in Career Guidance. The "knowledgeable persons" interviewed were largely concerned with recent developments as were often the individuals responding to our questionnaires. Taken together, the views expressed should constitute some updating of existing material on various facets of guidance.

The Matter of Definitions

We were impressed, particularly in our initial interviewing experiences, by the insistence of those whom we consulted that we be "careful about definitions."

These warnings did not appear to relate to the rigor of the logic underlying the definitions we might choose to employ or to their elegance of expression. In fact, more than once we were advised that how we defined the terms we used was not important. What really mattered was that our readers know what meanings were ascribed to these terms and that these meanings be consistently adhered to throughout.

As our study progressed we came to appreciate increasingly the merit of these injunctions. Differences in the definitions of certain activities or subject matter areas in the guidance field can be the outward evidence of opposing theoretical constructs or of divergent views of how these may best be operationalized.

For our part, we had neither reason nor wish to consign ourselves to any particular doctrinal camp by way of our usage of certain terms. If we could make reasonably clear the sense in which we were using such terms as Career Guidance, Career Education and career information, giving our view of their parameters and their interrelationships, it should be sufficient for purposes of this study. Following are the meanings that we are attaching to a few terms where questions could arise concerning our usage.

We have taken Career Guidance to mean, simply, efforts to provide assistance to people in relating their special characteristics to their career choices and progress.

In our attempt to frame a simple and utilitarian definition of this term we have obviously left its content open, except for specifying that the essence of the activity is an attempt to facilitate for the individual a matching process between self and the choices he will make in launching out upon and continuing a career. We have not specified within the body of this definition those elements of self (whether aptitudes, interests, values or whatever) that are to be most closely attended to in this matching. We have not spelled out those characteristics of a career that it is most important to link to the individual's characteristics in order to achieve a satisfactory congruence between self and career. Nor have we defined "career", listed the practices that are believed to serve best as the vehicles or transmitters of guidance, nor stated the criteria against which the efficacy of the guidance provided might be evaluated.

We believe that the broad and essentially "practical" objectives of this study can be satisfactorily served with the ascription of popular or lay connotations to the content and methods of Career Guidance. As our research centers around science majors at the secondary school level, it should be enough to say that our focus will be upon adolescents and young adults, (however motivated in this direction) who have evidenced what they believe to be their interests in and capabilities for pursuing careers in science and technology by undertaking majors in science, and also upon those who may have the potential to do so.

We have also assumed that guidance is comprised of both content and method.

Its content is the information and the experiences that can be provided to clarify self and career to the individual and to facilitate his decision-making. Its method is to be found in the various practices associated with providing this information--experience, and instruction--whether via counselors, the written word, mechanized delivery systems, career centers, teachers, use of role models, simulations, exploratory work experience or whatever.

It should be noted at this point, however, that despite the parsimony of our overall definition of Career Guidance, we have found it necessary in facilitating our later discussion of trends in guidance to draw a rough distinction between two types of activities. The older, although it may well be the most prevalent type, rests upon trait-factor theory and is conveyed largely through one-to-one counseling assisted by the more conventional guidance materials. This mode we call vocational counseling. The newer mode, resting on developmental theory and involving a larger team of pupil personnel staff and a wider gamut of learning experiences, we refer to as developmental career guidance.

By career, we mean the totality of work that one does in his or her lifetime. Thus, career (when "work" is defined as a conscious effort aimed at producing benefits for one's self and/or others) is a broader concept than when it is defined as simply a succession of jobs or occupations. It is sufficiently broad for education to be included as part of career. Whether or not post-retirement activities should also be considered as part of one's career need not concern us because of the age group with which we are dealing. (10) Essentially, we are adopting this broad a definition of "career" so as not to limit the Career Education concept to the merely vocational aspects of life.

As Career Education is still in a stage of conceptualization, many definitions are put forward from among which one can choose. We have not attemtpted to define Career Education in its totality because to do so places limitations upon the areas it encompasses. Rather, we prefer to list various of the elements that are commonly conceded as falling within the domain of Career Education. And the latter appears to us as being primarily an infusion into education and an infusion into guidance even though one could also view Career Guidance as "an arm" of Career Education. Further, we have listed only those elements of Career Education that appear particularly appropriate as components of the education and guidance which might be provided to science students at the secondary school level. These include:

> Infusing the academic and general curriculum course offerings with career relevance (frequently by way of what are called "Career Education modules" or "instructional experiences").
>
> Providing educational experiences to give students increasing knowledge of occupational alternatives and the world of work.
>
> Providing for greater involvement of employers in the educational experience of all students through work-study and cooperative educational programs and through participation in occupational

> guidance, career orientation and placement activities.
>
> Providing students with career counseling that follows through to job placement or further education and which, although based on the principle of maximizing individual choices, advises students of options that are realistically related to labor market conditions.
>
> Providing graduates from the secondary level and from each level thereafter with either the skills to enter the world of work or to embark on additional education.(11)

The term career information does not present the knotty problem raised by attempts to define Career Guidance and Career Education--that of relationship, the one to the other. Career information is indubitably required in both Career Guidance and Career Education. We use the term simply as a bracket for Occupational Information and Educational and Training Information.

Occupational Information is the kind needed for vocational choice: descriptive information about occupations (such as job duties, related jobs, opportunities for career advancement and hiring channels); economic information (such as numbers, kinds and location of workers in the occupation; employment outlook; and earnings) and the personal requirements of the occupation (such as interests, aptitudes, temperament, skills and physical requirements).

Education and Training Information is the kind needed by the person who has made at least a tentative career decision and desires some formal schooling or training to prepare for entry into an occupation or group of occupations. This type of information is concerned with preparation requirements of the occupation, related post-secondary educational and training programs, and the institutional characteristics of the two and four year colleges that might be appropriate to the educational preparation required for the occupation tentatively selected.(12)

Within the context of current conceptions of Career Guidance it would be proper to say that the body of information we have defined above as Occupational Information is conveyed for the purpose of developing career awareness. When it is considered in this light, greater importance than formerly is placed upon characterizing career opportunities in such a way that some picture of the "life styles" associated with various occupations is transmitted to the student, in addition to the hard data specified in our definition. Further, there is a growing trend towards emphasizing current, local occupational information--a requirement often met by considering Job Bank openings at the local employment service office to be an acceptable surrogate. This trend can be expected to increase as the job placement function for terminal high school students acquires greater emphasis under Career Education practices. However, we consider current local job openings and job finding techniques as falling under the "Job Search Information" category rather than within the more durable type of informtion comprising that part of Occupational Information which we have included under the rubric of career information.

Also, when the newer conceptions of Career Guidance are taken into account, rather more is demanded of Educational and Training Information than we have indicated in the quite pedestrian list specified above. If it is an objective of guidance to develop educational awareness, attention must then be directed not only to detailing educational opportunities in specific institutions and programs but also to reflecting the tone and style of various educational environments and to emphasizing the relationships existing between specific career choices and their educational requirements.

Two other objectives of Career Guidance in its emerging form also call for bodies of information and materials to support them. These we are not including within our definition of Career Information as such although they will receive attention in this report. One of these objectives is to develop self-awareness through the individual's understanding of his abilities, interests, values and personal characteristics. This objective carries in its train the vast armamentarium of test instruments that has been developed over the years.

The other objective is to develop planning skills through an understanding of decision-making, coping skills, and the procedures required to advance from school to work. The body of materials supporting this objective and conveying these skills ranges from games, simulation techniques and student work books to components of programmed instruction. These latter, usually designed to "teach" decision-making or describe strategies for relating abilities, interests and values to career opportunities, are to be found in the software of some of the computerized guidance systems.

Framing the Recommendations

As we move in this report through the types of theory that undergird guidance practice, the information needs of students as they themselves see them, and a review of various guidance materials and practices, we shall attempt to derive from these essentially descriptive accounts of the current status of guidance some notion of the general areas within which action should and can be taken to improve the effectiveness of Career Guidance.

By itself, this first step towards producing a document for the Education Directorate of NSF is not enough

> *"to enable it to better determine the appropriate priority of actions it should undertake to improve the effectiveness of Career Guidance for future science majors."* (13)

Recommendations sufficiently specific to provide an adequate response to the charge implicit in the above must carry some notion as to priority of action. Also to conform with the mission and organization of the Foundation these recommendations must necessarily center on science students as a "special population" and specify actions that are appropriate and feasible for this agency.

To help us in making this transition from the general to the specific, we have relied heavily upon the answers given us in interviews and questionnaires to such direct questions as, for example,

> *"Are special provisions needed for the Career Guidance of Gifted students, particularly those with strong capabilities for entering occupations in science, mathematics or technology?"*

Or,

> *"Are there any problems in conenction with preparing occupational projections that particularly limit your capabilities to forecast employment in scientific and technical occupations?"*

Or,

> *"What specific aspects of Career Education might particularly benefit the student considering a career in science, mathematics or technology?"*

Or,

> *"Specifically, what action could the National Science Foundation appropriately undertake to assist in resolving the problems you have identified?"*

Two elements, strongly present in the answers we received to questions such as the above did not assist us in making "this transition from the general to the specific."

One was a current, running through the thinking of many, if not most, of our respondents that in order to improve the guidance materials produced for science students or the guidance procedures available to them, it is necessary to improve materials and procedures for all students. In many situations this is an unarguable position because of the interrelationships existing among the components of the complex systems out of which emerge the materials or procedures in question. Where this is the case, our recommendations are directed to improving the existing system in toto.

Also, there was often a question in the minds of our respondents, as there is in our own, as to what types of actions it is appropriate and feasible for the NSF to undertake. In response to an inquiry on this score made by the writer, the thought was expressed that too rigid an adherence to past practice in interpreting the appropriateness of agency action might well foreclose consideration of innovative, or at least hitherto untried, courses of action. Thus, some of our recommendations may quite inadvertently imply the taking of actions that lie outside the scope or the capabilities of the Foundation.

As to the element of priority that is assigned to certain recommendations as compared to others, we have followed two guidelines. We have looked for those areas where, seemingly, a small amount of assistance will effect a large return. And we have depended upon a sort of time-sense which indicates that the fruitfulness of certain actions will be very much greater if they are taken sooner rather than later.

Conclusion

Various matters of significance to the conduct of the present study have been brought together in the foregoing chapter because, when combined and detailed at the outset, they shed light on the rationale underlying the project report's content and its orientation.

The matters discussed have included our indebtedness to the several sources that provided us with information permitting us to aim at fulfilling the study's purpose and to pursue its objectives. This purpose and these objectives were noted as summarizing the theories, practices and materials of Career Guidance in order to assist the Education Directorate of the NSF in assessing the current status of guidance and in determining the appropriate actions to improve it for science students.

We have also commented on the research methods employed in conducting this study. And we have attempted to forearm the reader of this report with a knowledge of the meanings we are ascribing to certain terms that will recur throughout its length, as well as of the process followed in order to formulate the recommendations that appear in the concluding chapter.

REFERENCES--CHAPTER I

1. Borow, H., ed., Man in a World at Work, Houghton Mifflin Company, Boston, 1964.

2. Herr, E.L., ed., Vocational Guidance and Human Development, Houghton Mifflin Company, Boston, 1974.

3. Osipow, S.H., Theories of Career Development, Second Edition, Century Psychology Series, Appleton-Century-Crofts, New York, 1973.

4. Campbell, R.E., et al, Career Guidance, A Handbook of Methods, Charles E. Merrill Publishing Company, Columbus, Ohio, 1973.

5. Hansen, L.S., Career Guidance Practices in School and Community, National Vocational Guidance Association, Washington, D.C., 1970.

6. As examples, A Study of Career Centers in the State of California Final Report, California State Department of Education Vocational Education Act Research Project, Grossmont Union High School District, La Mesa, California, 1975. Or Interim Report, Demonstrating the Planning Implementation, and Evaluation of Developmental Guidance, Counseling and Placement Components in a Career Education System, Exemplary Project in Vocational Education, Mesa Public Schools, Mesa, Arizona, 1975.

7. As examples, Occupational Information Projects, An Exploratory Study Prepared for the Office of Assistant Secretary for Policy Evaluation and Research, U.S. Department of Labor, by John K. Harris Associates, Washington, D.C., 1973. Or Willingham, W.W., Ferrin, R.I., Begle, E.P., Career Guidance in Secondary Education, College Entrance Examination Board, New York, 1972.

8. As examples, Super, D.E., Computer-Assisted Counseling, Teachers College Columbia University, New York, 1970. Or Hoyt, K.B., and Hebeler, J.R., eds., Career Education for Gifted and Talented Students, Olympus Publishing Company, Salt Lake City, Utah, 1974.

9. As examples, the Personnel and Guidance Journal, Special Issue, "Technology in Guidance," Vol. 49, No. 3, November 1970. Or "Career Development: Guidance and Education," Vol. 53, No. 9, May 1975.

10. See discussion of the distinction between work, career, and occupations in Hoyt and Hebeler, op. cit., pp. 42-45.

11. The list of Career Education components selected for inclusion although not always quoted verbatim, is drawn from an outline prepared by Dr. Duane Mattheis, Deputy Commissioner for School Systems, U.S. Office of Education (September 20, 1972) which appears in Hoyt and Hebeler, op. cit., pp, 24-25. Of the several definitions, lists of objectives and the like of Career Education presented in the above work, those selected appear most nearly to coincide with the thinking we encountered while gathering information for the present study.

12. The distinctions made in these terms have been utilized in connection with the National Occupational Information Service grants program of the Manpower Administration, U.S. Department of Labor. They were clearly stated, and in greater detail, in a paper presented by Dr. Barry E. Stern of the Department of Labor at a conference on "Improving Labor Market Information for Youths," at Temple University, October 22, 1974.

    It should be pointed out that career information comprises but one part of Labor Market Information which also includes both macro- and micro-information about other aspects of manpower and the labor market. Also, career information is not identical with Job Search Information to which it is related. The latter is required by the terminal student, or by any worker seeking employment. This type of information as compared to career information is less concerned with employment outlook and other long term considerations and more concerned with such immediate matters as the location of employing establishments, hiring channels, and the methods of completing work applications and of responding to employment interviews.

13. See Project Summary of this study, November 7, 1974.

WHAT THEORIES OR PRINCIPLES UNDERLIE THE CAREER GUIDANCE PROVIDED STUDENTS?

CHAPTER II: THEORIES AND PRINCIPLES

Introduction

There is no theory of Career Guidance as such, for guidance is a body of practice rather than a theoretical construct. There are, however, theories that may be said to underlie guidance practices. These conceptualize the process of career development upon which can be based a practitioner's efforts at assisting people to relate their special characteristics to their career choices and progress.

In this chapter, after discussing the theoretical underpinnings of guidance practice, we will follow the four-way classification of career development theory proposed by one author, note the highlights of each type of theory and point out its implications for guidance practice. Also, we will indicate the problem areas connected with the conceptualization and implementation of these theories that should be considered for priority attention in efforts to improve guidance practice.

Next, we will list those "principles" of career development theory to which leaders in the field are currently subscribing and which appear likely to affect guidance practices increasingly in the future. Newer and expanding practices derived from these principles are noted, as they are quite probably the ones that should receive priority attention with respect to their significance for the Career Guidance of science students at the secondary school level.

Finally, a distinction in theory dividing the computerized systems into two groups is mentioned because it is significant to the priority of actions which could be undertaken to improve the effectiveness of Career Guidance for future science majors.

A Substructure of Theory for Guidance Practice

One distinguished authority, consulted in connection with the present study remarked that "there are no theories of guidance, but there are theories of counseling." Another authority, asked to comment upon this statement, refused to admit even to theories of counseling. According to this expert, "Counselors have theories but there are no theories of counseling." The theories held by counselors were described as ranging from theories of career development having applications to vocational counseling, to those upon which various methods of interaction, diagnosis and treatment are based--particularly when personal rather than vocational counseling is involved. The comments cited indicate that insofar as the present study is concerned with the theoretical underpinnings of Career Guidance practices, such a theoretical substructure as can be detected must be sought mainly from among what have been categorized as "theories of career development."

This approach appears eminently defensible. It is not difficult to maintain that Career Guidance (which we are defining as practices aimed at assisting people to relate their special characteristics to their career choices and progress) should rest upon theoretical constructs describing the origin, shaping, and nature of these characteristics and the complex process of growth, choice and happenstance that constitutes career development. But it can not be readily affirmed that there exists a generally accepted, comprehensive and internally consistent body of theory concerning career development. To the best of our knowledge, no theoretical structure has been proposed, possessing explanatory adequacy and satisfactory empirical support that is specifically oriented to affecting a wide span of guidance procedures. Nor, for that matter, can there be found various competing theories possessing these attributes.

One authority (1) has characterized the current state of this needed theoretical substructure for guidance practices as follows:

> *"It is important to realise that theories of career development are not theories in the traditional sense...current theories of career development are not full blown but rather are theory 'fragments' which attempt to integrate and systematise a portion of human behavior with respect to a specific human problem."*

Another authority (2) commenting on the lack of a philosophy and a theory to serve as a springboard for methods, materials and applications has characterized the situation more succinctly, "In essence, we are now confronted with random materials in search of a philosophy."

To this basic stricture against the body of career development theory--that it lacks structure and the cohesiveness that would bind its several components together--can be added other and commonly voiced criticisms. These include the lack of progress in theoretical formulations that has permitted technological innovations in the guidance field, particularly as to means of information delivery, to outpace development of the materials to be delivered and the theoretical bases upon which these materials rest. Also commonly noted is the extreme difficulty of determining practical applications, in terms of guidance procedures and practices, of the various theoretical constructs thus far developed. And where such applications can be observed there is the taxonomic problem of subsuming given practices and especially entire systems under specific theories, so great are the overlaps and interminglings of these constructs.

Because of the difficulties of establishing other than essentially tenuous linkages between theory and practice in the field of Career Guidance we more than once found ourselves counseled with remarks of the following sort when soliciting expert opinion during this study's data-gathering phase:

> *"Don't get mired down in theories about guidance as nothing constructive can be done in this area. At the same time so much can be done in guidance practices without resolving these battles."*

It is important to note that this remark and others of its kind were made by individuals who were actively engaged in counseling or in producing and disseminating guidance materials.

In all fairness, though, it must be recorded that respondents of a more theoretical bent took a totally different position. They would sometimes go so far as to fault certain systems which, on a purely pragmatic basis were doing a creditable and needed job of career information dissemination. They were not grounded on what, in the critic's opinion, was a sufficiently advanced or sophisticated body of theory to permit their being characterized as true guidance systems rather than merely information systems.

Differently oriented but also pertinent were the comments of some designers of computerized systems. Insistent on the necessity of basing guidance practice upon an adequate conceptualization of career development, they tended to object to the rather simplistic one-word or single-phrase categorizations (as "trait-factor" or "developmental") that have appeared in taxonomies describing their highly complex systems. Were one word called upon to designate the theoretical formulations underlying the design of these systems and most particularly the setting of associated practices within which their use is embedded, a better word would seem to be "eclectic."

A Classification of Theories

Despite the admitted dififculties of finding Career Guidance systems, whether or not computerized, or Career Guidance programs, all of whose component practices represent clear and consistent expressions of career development theory, it is nonetheless evident that certain streams of theorizing or certain concepts can be identified with specific guidance practices.

Linking theory to practice requires, first of all, a classification of the theories to be appraised in this respect. It should be noted that, in the field of guidance, theories may more readily be classified than can either theorists or systems because of the eclecticism of the latter two.

As a starting point, we shall turn first to the author (3) who has most explicitly dealt with the subject of classifying theories of career development and of searching out their implications for practice. Samuel H. Osipow assigns existing theories of career development (which can also be described as conceptualizations about career choice or as approaches to thinking about counseling) to four distinct groups. These are:

1. Trait-factor theory
2. Sociology and career choice theory
3. Self-concept and developmental theory
4. Vocational choice and personality theory

It must be emphasized, however, that these theories, approaches, models, or however they are labeled are by no means independent of one another. Writes the author,

> *"They are closely intertwined and in many instances draw heavily upon one another both in terms of actual practice*

> *and in empirical research. For example, in the self concept or developmental approach, part of the image of self-concept is based on tests which reflect the trait-factor approachs; also, Roe's personality theory of career choice includes many developmental factors."*(4)

Next, using Osipow's structuring of the body of career development theory into the above four quite general, and, possibly, arbitrary classifications, we will attempt to point out what, in our view, are the implications each type of theory holds for the practice of Career Guidance and for the priorities of those attempting to affect the latter.

Trait-Factor Theory (5)

So empirical rather than conceptual in nature is trait-factor theory that it verges upon being a "non-theory." Its basic assumption is that career choice is a matter of matching oneself against jobs in terms of interests, aptitudes and, possibly, various other traits. A corollary of this assumption is that persons with certain traits in common will be found in similar occupations.

Measured against subsequent formulations of theory, this earliest view of career choice may be seen as relatively static. If the matching process were accomplished correctly in the first instance, the chooser's decision would have been permanently accomplished and all need for subsequent or continuing counseling intervention would be at an end.

Actually, matters are not this simple. There is quite likely no single moment of choice, but rather a long development towards, and of, career decision. Nor is a single decision likely to suffice in this modern age. Both individuals and the job world are sufficiently complex that most persons can perform satisfactorily in a variety of jobs and most jobs are filled by workers possessing a variety of attributes.

Hence, it can be no surprise that this earliest theory to underlie vocational counseling has been challenged for its limitations despite a long effort to determine empirically the controlling variables of career choice and to link its usage with subsequent career satisfaction or career success. Nonetheless, the matter of matching occupation to individual remains central in the process of career decision-making, for to discover an occupation (or a series of occupations) that is satisfying is, in large part, the objective of this process. Thus, we can expect to find aspects of this theory integrated with other theories resting upon quite different premises.

The implications of trait-factor theory for counseling and for career guidance in general, are several. There is good reason to believe that in the majority of vocational counseling interventions, the counselor regards career choice as a matter of matching jobs against self in terms of interests and aptitudes. This approach clearly dictates that procedures and materials be used that will enable the counselee to clarify many details about himself and much detail concerning the world of work. The need for this detail (plus the pervasive belief that better decisions are made with adequate information than without) has sparked development of the instrumentation and materials of vocational counseling--its armamentarium of tests and of career information both educational and occupational. Given this relationship between adequacy of information and efficacy of decision-making, all efforts to improve the quality and enhance the availability of relevant information for the decision-maker must have a high priority when the objective is to improve Career Guidance.

Nor is the only application of trait-factor theory to be found in the intervention of the human counselor. One of the most important decisions to be made respecting the design of computerized systems lies in the means of access of the user to the system (whether by means of interests, aptitudes or other characteristics) and the linkage of these traits to the educational and occupational information he will retrieve. Much more needs to be learned than is now known concerning the comparative effects upon the information that will be displayed because of employing one rather than another access route.

In fact, the growing use of computerized Career Guidance systems, as much or more than the ubiquitous employment of a trait-factor approach in the conventional counseling mode, indicates that both action and research focusing on the instrumentation, materials, procedures and the logic used to implement this approach will long be warranted. This will be true even if the materials and procedures that are to be examined, evaluated or modified are components of systems or programs that have arisen out of other conceptualizations of career development than those characterizing trait-factor theory.

Sociology and Career Choice Theory (6)

No matter what the role played by aptitudes and interests in career choice, or the genesis of these traits, external factors do influence and may well determine career decision-making whatever its process. Thus, there is place among career development theories for those based on the assumption that elements beyond the individual's control exert a major influence upon the course of his entire life including his educational and vocational decisions.

Depending upon the theorist expounding this view, the situational factors proposed as important will vary, as will the manner in which their influence is thought to be exerted. Some theorists stress that an individual's self-expectations are not independent of the expectations that society has for him. As examples, society can present its educational and occupational opportunities in relation to the individual's sex, race, social class or other non-performance characteristics.

Further, it is not difficult to demonstrate that chance often plays a major part in the educational offerings selected and in the availability of the entry job that marks the start of a work career, as well as in subsequent events effecting career progress.

Theorists subscribing to the importance of situational factors as determinants of career choice tend to emphasize the need for recognizing that educational and vocational choices most probably reflect a compromise between the individual's basic inclinations and the possibilities the culture opens to him.

In other words, there is an interaction between individual and environmental press in the making of career decisions. Viewed even more broadly, a case can be made that the physical and social environments create institutions whose characteristics exert a very real influence on the individual's personality and hence on his occupational behavior.

Because theories of social systems are essentially descriptive, their implications for counseling practice have not been significant. Related to the subject of career choice they have, however, generated a large body of research seeking to explore the relationship of such variables as social class, occupation of father and various situational "accidents" to educational and occupational decisions. The results of this research have strong programmatic implications for Career Guidance. They suggest that career development must at least to some extent be viewed and implemented within a context of situational determinants.

It then follows that, first, special programs must be developed for particular groups of individuals who, disadvantaged by some aspect in their situation, require particular attention if they are to raise their aspirations to a level commensurate with their capabilities or to achieve adequately once they have done so.

A second priority action that derives from these theories is to increase the degree to which individuals whose perspectives have been narrowed by their status are made aware of the various career possibilities that are open to them, and of the fact that they have the right and option to make a choice. Sound occupational information and its effective delivery to these individuals is required if opportunities are to be equalized for all. In fact, it appears probable that if this information is to remove the effects of disadvantagement, it must go beyond the customary descriptions of educational requirements, specific qualifications for hire, job duties and wages, and convey a feeling for the life styles and job settings involved in a given career.

Self-Concept and Developmental Theory (7)

According to self-concept and developmental theory the process of career development is a continuing one, a process that is largely a matter of developing and implementing self-concept.

The static quality of trait-factor theory is broadened in this conceptualization of career development as evolutionary in character and as conforming to the larger pattern of human development. Also, the earlier theory's relatively narrow scope is broadened through introduction of self-concept, a different construct than a sum of aptitudes and interests--particularly when its implementation is seen as evolving through a series of life stages during each of which certain vocational tasks must be accomplished.

Central to this theory is the notion that the individual strives to follow a career pattern basic to his life style and thus to implement his self-concept--a concept molded by genetic influences and psychological factors, yet operating in combination with environmental variables such as social and economic conditions. This, the individual does by following the career pattern he sees as most likely to afford him self expression and to coincide with his life style.

Various behaviors to implement self concept vocationally are appropriate throughout this life-long evolutionary process because each life stage calls for vocational behavior of a different sort. The adolescent must explore until he finds direction for himself. The young adult must translate this direction into action for training and job seeking. Yet other behaviors are called for at later life stages. Meanwhile and throughout this process, the adequacy with which the individual has performed the behaviors appropriate to each phase of his development is the measure of his vocational maturity.

Developmental theory has direct application to Career Guidance principles and procedures and it furnishes a rationale for certain counseling practices and for various programmatic efforts. It justifies use of vocational counseling in the guidance process. The postulate that the self-concept, although a function of genetic influences and psychological factors does develop and change in combination with environmental variables opens this concept, at least in part, to outside intervention. Such intervention is likely to be most effective in adolescence, the period when counselors have the readiest access to students.

The theory also implies that individuals with accurate information about themselves and about the world of work will most likely make sound vocational decisions appropriate for the life stage at which they find themselves. It follows, therefore, that the provision of appropriate information and exploratory experiences is critical to career development.

At one stage or in one circumstance this information may affect self-concept--the individual's cultural, social and biological background that must be integrated into his career decisions. At another, it may concern aspects of the occupational field in which the student's interest is greatest. Throughout, the student must be directed towards vocationally relevant tasks that will permit reality testing and he must develop a sense of "planfulness" to facilitate readiness for choice. As career development proceeds the need for identifying the career alternatives to be explored and for help in these explorations obviously increases the demands made upon both the information systems and the guidance procedures used to furnish this assistance.

Developmental theory has implications for education no less than for guidance. In fact, this theory's emphasis on a graded exposure to concepts of self and concepts of work together with appropriate exposures to information and experience that will permit reality testing, finds its mirror image in Career Education. A continuous emphasis on self-awareness and occupational exploration, provided throughout the entire curriculum and by way of experiential contacts with the work world, seemingly reflect Career Education's extension to classroom and community of the same concepts that underlie developmental theory.

Even a brief review of developmental theory indicates certain areas that might well receive the priority attention of those seeking to improve Career

Guidance, either in general or for specific groups. The sheer bulk and especially the detail of the occupational and educational information required to implement any developmental model of Career Guidance adequately speak loudly for computerized career information systems. This opens up an entire world of possibilities for research and action directed towards their design, operation, data base, and evaluation in terms of their comparative effect either upon all users or upon specific populations of users.

The emergence of Career Education, strongly influenced by developmental theory, may ultimately spell the transference of Career Guidance in large part from among a variety of student personnel services provided by the counselor to the educational curriculum. This assuredly means that findings resulting from investigations limited to counseling practices and procedures will no longer suffice to portray adequately the current status of guidance. Given the objective of exploring through research, or taking action to improve, the Career Guidance provided to certain special groups, it may be far more pertinent to investigate the services these groups will receive with the implementation of various Career Education models than to trace out their treatment where only vocational counseling is provided.

Vocational Choice and Personality Theory (8)

All theories of career development must in some sense have roots in personality theory, as explaining the person constitutes an important part of the person/vocation equation in conceptualizations regarding the process of career choice.

The components and the emphasis of a given personality theory that are related to career choice (and some theories are comprehensive while others are but fragments) vary with the individual theorist. Central in a comprehensive theory of this type, however, is an effort to link certain personality types (or attributes of personality) to career membership by establishing a measured or psychoanalytically derived relationship between the individual personality style and the modal personality required for satisfied functioning in a given occupation.

Efforts to accomplish this linkage have taken reasoning about career choice beyond the trait-factor approach which, concentrating on interests and aptitudes, merely postulates that certain personality traits are more likely to be associated with some occupations than with others. Personality theory has added such constructs to the concept of personality as needs which are intrinsic to individuals and, in motivating behavior, may account for career aspiration. Values also have been added. Although different from needs in being predominantly social in origin, values can influence behavior in similar ways. Moreover, personality theory holds that the individual's particular needs and/or values will influence his career choice, his career behavior and the degree to which the career he chooses will be satisfying.

Building these premises into larger formulations of the process of career development has followed several directions. Detailing the personality types most consonant with the career areas to which they are linked has been one, for the specification of these areas and the field and level of the occupations comprising them has proceeded together with the delineation of congruent personality types.

Research effort has often concentrated upon determining the particular personality factors involved in career choice and career satisfaction and probed for their origins, whether genetic or environmentally induced. Many investigations have explored the personality characteristics of people in different occupations and of students preparing for them, while others have examined the life styles associated with specific occupations. Meanwhile, at the periphery of personality theory have been the conceptions of career choice that are rooted in psychoanalytic theory and that have brought into this stream of thinking such concepts as initial parental relationship, sublimation, identification and ego strength.

The implications of personality theory for Career Guidance are several. For one, this body of thinking serves as a caution that given the complexity of personality the guidance process can be no simple matter. Complex interactions exist between aptitudes, interests and personality style as related to career choice. This complexity must be dealt with in the variety of instrumentation used for individual assessment, the validity of the procedures that identify specific personal orientations with particular occupations or career areas, and the depth and detail in which guidance materials are prepared in order to describe educational and occupational environments.

This theory's implications for guidance suggest that priority areas for attention from those who would explore through research or take action to improve Career Guidance should include the construct validity to be found between measures of interests, personal orientation and occupational preference. Also, included should be the empirical verification of those linkages that are postulated as existing between such constructs as values and certain occupations considered as offering in varying degrees a potential for their expression.

Other areas deserving attention would appear to be the continuing study of those external events, influences and environmental factors as well as achievements which seemingly shape personal orientation in particular career directions, and experimentation to determine if certain practices are more effective than others in the guidance of students exhibiting specific capabilities and interests (in science, for example) in their personality styles. Certain aspects of personality theory also point to the utility of developing educational and occupational information that conveys more of the "style" and the psycho-social factors characterizing the institution or job being described than do the materials now generally available.

General Implications of Theory for Career Guidance Practitioners and for Guidance Systems

The somewhat deprecatory statements characterizing the current status of career development theory with which this chapter opens are by no means intended to obscure the fact that some theoretical positions, whether or not recognized or stated explicitly, necessarily underlie the counselor's stance when he is confronted with career choice questions. What he considers required in order to provide effective guidance will largely depend upon what he believes to be the status of the counselee's maturity and, therefore, the behaviors needed for its advancement. What he suggests will vary with the counselor's view of the process of career choice. One set of procedures will likely be used if career development is seen as a matching of self against occupations in terms of interests and aptitudes. Another will be employed if it is viewed as an elaboration and extension of self.

Even if no more than the practice of the individual counselor were at issue, there are very real advantages to following an explicit theory of career development (or at least explicit principles drawn from this theory) rather than relying on "intuitive judgments" of the moment. A formalized undergirding in theory of practice can guide the counselor in his hypotheses about a counselee's behavior and provide him with means of conceptualizing his professional experiences and of utilizing the research results of others.

Where the design of systems or of comprehensive programs to provide Career Guidance is involved, it is even more important that the principles upon which these programs are based be explicit and that their implications for practice be recognized.

Perhaps for the above reasons, or because of the increasing attention being given to Career Guidance and to Career Education currently, there has been a recent proliferation of "Statements," Models," "Plans" and the like, published by State Departments of Education, school districts, professional associations and others. (9) The ideas or principles enunciated are generally similar and represent, in the main, a selection of premises largely taken from developmental theory that can be made operational. The "principles" listed below are presented because they are typical of those that underlie so many of the models that are now being discussed for implementation or are in process of implementation. Also, they convey a clearer notion of the theoretical substructure of those guidance practices now considered as being in the vanguard than can a review of the theories of career development.

Indications of the Nature of Future Guidance Practice

Lorraine Sundal Hansen (10), in a recent work and after summarizing certain "key ideas" emerging out of a mass of definitions, trends, research projects and conferences which she reviewed for their content, lists the major themes that appear to recur again and again as shown below:

> "1) *Career development is a continuous, developmental process, a sequence of choices which form a pattern throughout one's lifetime and which represent one's self concept.*
>
> "2) *Personal meanings or psychological determinants of work (what it means in the life of an individual in relation to his values and life style) may be far more important than external job characteristics.*

> "3) *Career development involves a synthesis or compromise, a reality testing which involves role identification, role-taking, and role exploration, assessment of self and of opportunities and of the economic conditions in society.*
>
> "4) *Career patterns of individuals may be influenced by intelligence, sex, location, socioeconomic level, economic conditions and the changing nature of the world of work in an advanced technological society.*
>
> "5) *Career development is part of human self development, involving different developmental tasks at various life stages, and individuals varying in their readiness for such tasks or their vocational maturity."* (11)

The author then spells out as following from the above propositions certain "assumptions which might undergird a new approach to vocational guidance in the schools." Based upon our reading of various programmatic materials now being issued in the form of models or plans for Career Guidance and for Career Education, and upon the returns from questionnaires that were sent to a group of school officials in connection with this study, we would characterize the following "assumptions" as basic to the guidance practices now being contemplated or undertaken by the more forward looking administrators. (12) As such they represent, in our view, the areas bridging theory and practice within which study and action should be concentrated if efforts to improve the guidance provided to specific populations of secondary school students are to be relevant in terms of emerging practices in the schools.

The author's list is quoted as follows:

> "1) *An integrated, cross-disciplinary program of career guidance as part of the regular school curriculum (K-12) is more consonant with new knowledge about vocational development than some of the isolated, one-shot approaches such as career days, college days, and once-a-year units.*
>
> "2) *It is possible to plan a series of vocationally relevant exploratory experiences or exposures which have meaning for the career development of adolescents; certain kinds of appropriate experiences can be defined at various levels and stages of student growth. This takes into account individual differences in "readiness," "needs," "goals," "values," and "planfulness" which need to be considered in developing a program.*
>
> "3) *The curriculum needs to be interpreted broadly to include kinds of experiences which bring the world of school and the world of work closer together. What this means is that more creative, imaginative, meaningful activities need to be planned which extend beyond school walls and beyond traditional subjects.*

> *"4) An integrated program has, as its goal, not the encouragement of the student to make a specific vocational choice but, rather, the fostering of an understanding of the variety of potentialities in self and society which might be fulfilled through career. This implies development of an occupational awareness and a sense of planfulness regarding one's own life. It may mean preparation for change, flexibility and adaptability.*
>
> *"5) An effective program of career guidance involves the total school staff and the community--counselors, teachers, parents, PTA, business and industry--in planning meaningful exploratory experiences, developing more varied and appropriate occupational information, and providing for adequate synthesis and reality-testing through the integration of information about self and work."* (13)

Hansen then classifies the projects and practices that follow from the above assumptions into the four types shown below. Again, practices of these types would appear particularly worthy of review in any effort to determine the impact of changing trends upon the guidance provided to specific populations of high school students. Hansen's list is as follows:

> *"These projects and practices which are trying to bridge the gap could be classified as: 1) curricular approaches and programs; 2) school-community cooperation and involvement; 3) projects utilizing advanced technology; and 4) gaming, simulation, and other innovative techniques."* (14)

In relation to "projects utilizing advanced technology," the author states that "Although many of the projects utilizing computers and multimedia are still in the reserach, development and conceptualization stages, there are some in actual operation."

As a large portion of the present study has been devoted to computerized systems, this chapter can most appropriately be closed with an attempt to show one relationship that exists between their design and career development theory.

Theory and the Design of Computerized Guidance Systems

Donald E. Super, in bringing together a series of papers presented at various professional meetings in order to tell the important story of computer-assisted guidance states that:

> *"Two theories appear to underlie current efforts: (1) the pragmatic approach, which seeks to improve what the counselor now does or would like to do in making information available to students, and (2) the developmental theory of decision-making, which is used in an effort to improve guidance practices."* (15)

Pragmatic theory is defined as one which

> *"holds that vocational choices will be improved by the possession of better information about occupations, better self-knowledge and sound reasoning concerning the relationship of self to occupational data."*

and is thus essentially an occupational model.

Developmental decision-making theory (16), upon which the career model is based is described by Super as that "which underlies the emphasis on teaching decision making..." Approaches resting on this theory have

> *"great appeal for counselors and educators who are more concerned with human development than they are with educational or occupational choices."*

He writes further,

> *"Choice-making being a recurring task, the focus on teaching how to make choices is unquestionably sound...But choice-making is still novel in so far as methods and practices are concerned. Attempts to computerize such a system therefore involve pioneering in the development of materials, methods and procedures of the system as well as in adapting them to the computer. This is a formidable task."*

Super's two-way classification of the theoretical substructure of computerized systems, made at the beginning of this decade, is of significance to this study. He follows the distinction made between the two models of systems with a prediction that the systems then extant would either add Career Guidance as a supplement to the Educational and Occupational Information they were providing or they would develop later models that more fully incorporated developmental theory. The evolution of CVIS to DISCOVER and of ECES I to ECES III has seen increasing attention to the development and inclusion of materials designed to teach decision-making.

The distinction made by Super has sometimes been expressed to us more vividly in the rough and ready categorizations of computerized systems voiced by individuals we interviewed. Sometimes the two types of systems (existing as "pure types" to varying degrees) were described as being either "computerized occupational information systems" or "counseling machines."

The significance of these two designations is clear. Those classified as "counseling machines" are assuming many of the functions of a human counselor who, following various precepts derived from career development theory, will attempt to assist the student in explorations, designed to match the latter's achievements and characteristics against the educational and occupational opportunities by means of which he can best express his own, unique potential. These functions, too, can include teaching decision-making by many routes, including instruction in the subject of probabilities, demonstrating the importance of values in making these decisions, and warning the counselee to ready himself for continuing career change throughout his working life.

It can readily be seen that the inclusion within guidance of such matters can introduce controversy into the design of computerized systems no less than arguments concerning the reasoning of human counselors--controversy and arguments grounded in competing theories. No doubt, it is out of this background that we were warned, as mentioned before, "Don't get mired down in theories about guidance as nothing constructive can be done in this area" despite the position of many theorists that the hope of improving guidance practices in the future lies mainly in the potential possessed by the career model of computerized systems.

Those who subscribe to the occupational model (one that might be described as primarily a system for the storage and retrieval of Occupational and Educational Information) and who view these systems as superior to the career model, may imply in their remarks that they question if Career Guidance, as it has come to be defined, is really possible. Or, if it is possible, they may question if our knowledge concerning the content of guidance, its methods of delivery, and the criteria to be used in evaluating its effectiveness is sufficient to justify our greatly increasing the populations that can be exposed to materials derived from still controversial premises through use of computer technology.

Adherents of this view, however, have their own problems. By no means does there exist even a satisfactory data base concerning eductional and occupational opportunities, particularly a base of localized data, with which the student using the occupational model could interact. It will be no less a "formidable task" to develop the administrative arrangements and the information systems needed to create this base than to work out procedures for developmental decision-making guidance, also a task which Super described as "formidable." It was primarily concern about data base problems that animated the respondent who warned against getting "mired down in theories about guidance" when "at the same time so much can be done in guidance practices without resolving these battles."

Proponents of systems models exclusively or primarily serving as storage units for educational, occupational and various types of facilitating information have another burden. It is for them to defend that the simple provision of this information is enough. Questions abound as to the potential of information to affect behavior, how these effects can be measured, and what behaviors, in fact, should serve as criteria for evaluating effectiveness. (17) But even when these questions are allowed to remain moot, there seems reason to fear that our present inability to construct and maintain adequate career data bases will lead to "computerizing chaos."

Hope that these dismal anticipations will not fully materialize may lie in efforts to impose a systems approach upon vocational guidance (18) and to design and implement comprehensive labor market information systems. (19) In general, an application of the systems approach to Career Guidance implies that instead of the encountered system there will be a designed system with externally set goals and objectives. Because of the multiplicity of guidance goals the design must be accommodated to including the complementary skills of many disciplines, the coordination of huge volumes of information, and many discrete yet integrated programs. The interrelationships of all parts of each other and to the whole, must be analysed and understood. Procedures to accomplish objectives must be designed and their results evaluated in terms of the objectives.

Also offering encouragement is a government grants program having as one of its objectives to test out the feasibility of various arrangements for providing the administrative setting within which a computerized guidance system can most effectively operate. (20) In the argot of a teenage counselee, there are those who are working to "get it all together", possibly the task now most loudly calling for priority attention.

Conclusion

With a view to staking out some of those areas within which actions should be undertaken to improve the Career Guidance provided to future science students, we have looked first to the theoretical substructure of guidance.

A review of four types of career development theory, intermingled as they are, shows the implications of certain tenets of this theory for guidance practice. Theoretical constructs of questionable validity are considered to be candidates for continued research effort, as are practices that can only be implemented inadequately, given the current state of the art and the resources presently supporting them.

Next, in order to convey some feeling for the order of priorities of actions that could be undertaken to improve guidance, we have attempted to signal the direction of future developments both as to the principles upon which guidance will increasingly be based and the practices growing out of them. To be relevant, efforts directed to improving the guidance provided to specific populations of high school students such as future science majors must take into account the potential for these populations of emerging practices and procedures.

Finally, following Super's division of computerized guidance systems into two major types in terms of their theoretical substructure, we have tried to demarcate whatever the future of the one vis a vis the other, the areas now needing attention in order to improve the guidance they deliver. This attention should take the form of research, various actions of a more tangible sort and, possibly most of all, a greater proclivity than has been apparent until now, to employ a systems approach.

REFERENCES--CHAPTER II

1. Osipow, S.H., *Theories of Career Development*, Second Edition, Century Psychology Series, *Appleton-Century-Crofts*, New York, 1973 (Preface to 1968 edition, as quoted in 1973) p. xii.

2. Commentary by Matthews, E., Professor of Education, University of Oregon, Eugene, Oregon, on page 652 of *Personnel and Guidance Journal*, Vol. 53, No. 9, May, 1975.

3. Osipow, op. cit., See in toto, though particularly pp. 9-11 and his section for each theorist, on "STATUS, Implications for Counseling."

4. Ibid, p. 11.

5. For *trait-factor theory*, see:

   Berdie, R. et al, *Counseling and the Use of Tests; a Manual for the Statewide Testing Programs of Minnesota*, University of Minnesota Press, Minneapolis, 1959.

   Darley, J.G. and Hagenah, T., *Vocational Interest Measurement: Theory and Practice*, University of Minnesota Press, Minneapolis, 1955.

   Hull, C.L., *Aptitude Testing*, World, Yonkers-on-Hudson, New York, 1928.

   Kitson, H.D., *The Psychology of Vocational Adjustment*, Lippincott, Philadelphia, 1925.

   Parsons, F., *Choosing a Vocation*, Houghton Mifflin, Boston, 1909.

   Williamson, E.G., *Students and Occupations*, Henry Holt and Company, New York, 1937.

6. For *sociology and career choice theory* see:

   Caplow, T., *The Sociology of Work*, McGraw-Hill, New York, 1954.

   Hollingshead, J.L., *Elmtown's Youth*, Wiley, New York, 1949.

   Lipsett, L., "Social Factors in Vocational Development," *Personnel and Guidance Journal*, 1962, Vol. 40, pp. 432-437.

7. For *self-concept and developmental theory* see:

   Ginzberg, E., Ginzberg, S.W., Axelrad, S. and Herma, J.L., *Occupational Choice: An Approach to a General Theory*, Columbia University Press, New York, 1951.

   Ginzberg, E., "Toward a Theory of Occupational Choice, A Restatement," *Vocational Guidance Quarterly*, 1972, Vol. 20, pp. 169-176.

Super, D.E., The Psychology of Careers, Harper & Row, New York, 1957.

Super, D.E. et al, Vocational Development: A Framework for Research, Bureau of Publications, Teachers College, Columbia University, New York, 1957.

Tiedeman, D. and O'Hara, R., Career Development: Choice and Adjustment, College Entrance Examination Board, New York, 1963.

8. For vocational choice and personality theory, see:

Bordin, E.S. et al, "An Articulated Framework for Vocational Development," Journal of Counseling Psychology, 1963, Vol. 10, pp. 107-117.

Holland, J.L., "A Theory of Vocational Choice," Journal of Counseling Psychology, 1959, Vol. 6, pp. 35-45.

Holland, J.L., Making Vocational Choices: A Theory of Careers, Prentice-Hall, Englewood Cliffs, New Jersey, 1973.

Hoppock, R., Occupational Information, McGraw-Hill, New York, 1957.

Roe, A., The Psychology of Occupations, Wiley, New York, 1956.

Roe, A., and Siegelman, M., "The Origin of Interests," The APGA Inquiry Series, No. 1, American Personnel and Guidance Association, Washington, D.C., 1964.

Rosenberg, M., Occupations and Values, Free Press, Glencoe, Illinois, 1957.

9. As an example, see:

Career Development: A California Model for Career Guidance Curriculum K-Adult - Prepared by a Task Force of California Educators under the auspices of the Bureau of Pupil Personnel Services, California State Department of Education, California Personnel and Guidance Association, Fullerton, California, 1972.

10. Hansen, L.S., Career Guidance Practices in School and Community, National Vocational Guidance Association, Washington, D.C., 1970.

11. Ibid., p. 19.

12. The answers given by the twenty-four state school officials responding to a question regarding the particular theories of career choice underlying guidance practices in the most prevalent patterns of guidance in their respective states showed about half noting "developmental theory," "Super's theory" or that practices were "influenced by Career Education." The remainder reported "No particular theories." However, in describing the theoretical bases of the more advanced patterns of

Career Guidance extant in their states, the response was near unanimous that some aspect of developmental theory or of Career Education could be said to underlie practice.

13. Hansen, op. cit., pp. 19-20.

14. Ibid., p. 20.

15. Super, D.E., ed., Computer-Assisted Counseling, Teachers College, Columbia University, New York, p. 119.

16. Loc. cit.

17. Datta, Lois-ellin, "Improved Labor Market Information and Career Choice: Issues in Program Evaluation in Labor Market Information for Youths", Seymour L. Wolfbein, ed., Temple University, Philadelphia, 1975, p. 127.

    Datta mentions the following problems in evaluating the worth of supplying Labor Market Information:

    > *"An evaluator studying how improved occupational information helps youth make better career choices encounters four problems: lack of a unified theoretical framework explaining the reasons for poor career decisions and why better information should yield improved outcomes; lack of a research base decribing the extent of the problem; lack of explicit consistent statements on what a better career choice would be; and lack of information on how directly and durably labor makret information affects the outcomes sought."*

18. See, for example,

    Campbell, R.E. et al, The Systems Approach: An Emerging Behavioral Model for Vocational Guidance, a Summary Report, Center for Vocational and Technical Education, Ohio State University, Columbus, Ohio, 1971.

19. See, as examples,

    Yavitz, B., Morse, D.W., Dutka, A.B., The Labor Market, An Information System, Praeger, New York, 1973.

    Thal-Larsen, M., Laner, S. and Mayall, D., Requirements and Design of a Labor Market Information System for a Large Metropolitan Area, Department of Industrial Engineering, University of California, Berkeley, 1972.

20. U.S. Department of Labor, Manpower Administration, Occupational Information Systems, Standards and Guidelines, 1974.

CHAPTER III: STUDENTS AND CAREER GUIDANCE

Introduction

One of the authorities whom we interviewed insisted that if it were possible to submit but one recommendation regarding the "contribution that NSF can make to the counseling given science-technology students," it should be to bring together the "designers and the consumers of guidance systems, and the chief consumers are the students." Again and again, this well known Professor of Education asserted that there has been almost no interaction thus far between guidance practitioners, those who design guidance systems, those who use them, and those "from the outside" who, in a consultant capacity, could bring their objectivity and expertise to system design.

The specific recommendation made in this instance was that the NSF organize a conference attended by the major systems developers, some students with high potential for entering science careers, some parents, some counselors, and some outstanding scientists. The first item on the agenda should be what the students really want to know; the second should be what the scientists think the students should know; and a third should be a discussion by the developers and the counselors on the extent to which what they are offering meets the needs that have been expressed. Such an encounter, our interviewee believed, would

> *"disclose gaps in the information content of career guidance, how essentially different are the implications of our various counseling approaches and existing systems, and what can be done to chart out a common ground for all of them."*

The proceedings of such an as yet imaginary conference would indeed furnish, were it actually held, valuable guidelines for answering the question, "What Career Guidance do science majors want?" Without this resource, however, we can only review various bits and pieces of research which, taken together, provide some small indications of student thinking on matters of Career Guidance and career information.

Assessing the Career Development of American Youth

A recent study designed to "assess and summarize core aspects of the career development of American youth" (1) was based upon a nationally representative sample of 32,000 students in the 8th, 9th and 11th grades in the 200 schools participating in the survey.

The strongly worded conclusion of those conducting the survey was as follows:

> *"Considered together, we believe these three vantage points for viewing student career development (what students say, do, and know) provide a consistent and dismal picture. If we were speaking of physical development rather than career development, we would describe American youth as hungry, undernourished, and physically retarded."* (2)

What replies from the students provoked so strong a reaction from those who conducted the study?

The word "hunger," no doubt referred to the finding that when the students were asked about their perceived needs for help from their schools 78 percent of the 11th graders (76 percent of the boys and 80 percent of the girls) recorded a need for help in making their career plans.* This concern tied for first place at 73 percent even for the 8th graders along with three other needs--improving study skills, improving mathematics skills and finding after-school or summer work. However, for the 11th graders the need for help in making career plans was far ahead of such runners-up as finding after-school or summer work where 67 percent of the students registered a need for help, or improving study skills at 65 percent. At the very bottom of the list for both grade levels was discussing personal concerns (30 percent of the 11th graders) and discussing health problems (15 percent).

The word "undernourished" was apparently used because of the students' small satisfaction with the help they did receive.

Of all the 11th graders, 85 percent recognized that career planning must begin before the final year of high school. Yet, when they were asked how much help their schools had given them with their educational and occupational planning 17 percent answered "none"; 32 percent, "a little"; 37 percent, "some" and 13 percent, "a lot."

Reactions such as these are clear in their meaning. It is difficult, however, to be certain of the students' opinions as to the comparative merits of different ways of helping them to plan their careers from their responses to a question on this point because the availability of the help for student use is not always obvious. For example, a reply that a given method (such as discussion with a counselor concerning their educational and job plans) was a lot of help, some help, of little help, or that help was not provided or used is meaningful. The fact that 35 percent of the 11th graders reported that counseling help was not provided or used can be evaluated in light of the statement that most of the students could see a guidance counselor when they wanted or needed to. But the fact that almost half responded that help was not provided or used when the means of giving assistance was by way of films of jobs, talks by workers, career days and tours is less clear. In this case we lack knowledge concerning the extent to which these means of assistance were available since the categories "not provided" and "not used" are merged. (3)

Finally, the analogy drawn between physical retardation and the students' degree of career development obviously stems from various responses indicating in the judgment of the researchers, a limited knowledge of the work world and a substantial amount of misinformation on career planning. They draw the conclusion that the "traditional one-to-one counseling model for helping youngsters 'choose their life's work' can no longer be justified," adding that "new approaches to career guidance and career education are amply justified."

---

*Data derived from this study as from the others that follow are presented in tabular form on Appendix pp. III-1 to III-7.

Student Opinion on Career Information and its Delivery

A far less ambitious study than the foregoing was undertaken by the writer in 1971. (4) The results are described at this point, not because this survey conducted in a single high school can be considered as representative of the national scene but because the questions asked were more directly related to the provision of career information than were those described in the above study. It is of interest that this survey (conducted in Berkeley, California--a college town with a higher than average population of workers in professional occupations) and its replication at an inner-city school of the neighboring town of Oakland, yielded virtually identical results despite considerable differences in the ethnic and socio-economic backgrounds of the 9th through 12th grade students questioned. (5)

The Berkeley survey followed the pattern of the national study in that the students were near-unanimous in wanting more knowledge of the work-world than they were provided. As in the latter study, girls wanted more assistance than did boys. And Black and Oriental students relied more heavily on the Career Guidance given by counselors than did White students.

When the students were asked about the content of the information they most wanted, the largest proportion (44 percent) gave as their first choice the training and education needed for jobs. Smaller percentages of students gave as first choice, in the following order, the kind of life associated with the job, skills and interests needed, wages and salary, future labor demand for the job and duties of the job. At the tail end were jobs where one can help people, location of jobs and promotional opportunities.

As to the ways of obtaining this information, the students overwhelmingly endorsed direct contact with the world of work as a means of learning about it. They most often expressed a preference for visiting places where the work is actually performed (43 percent) or for working part-time or in summer (23 percent). Talks with a counselor (12 percent), reading about jobs in books or pamphlets (5 percent) and work-experience courses (3 percent) followed. Smaller percentages gave as first choice visiting a career center at school, teachers, films, talking to employers and extra-curricular activities.

A recent San Francisco Bay Area study (6), covering eight high schools selected to reflect a representative mix of the area's diverse ethnic and socio-economic composition provides data related to young women with strong capabilities to pursue careers in science and technology. Even though this survey, unlike its precursor, was limited to high-ability young women and almost four years separate the two studies, the results are strikingly similar.

So far as the most wanted content of the information was concerned, the same three first choices topped the list in both the Berkeley survey and the survey of young women. However, training and education needed which occupied first place in Berkeley slipped as a relative position into second place for the young women. Kind of life associated with the job, which was second on the list of Berkeley selections rose to first in the later study, possibly indicating the increasing emphasis that students are now placing on "life style." Skills and interests needed held third place in both surveys. Wages and salary paid on the job which had been fourth in line as a first choice in the Berkeley survey dropped to eighth place in the young women's priority. Their first choice, now appearing in fourth place, was future labor demand for workers in the occupation, an understandable concern, given the changes which have occurred in the labor market for youth between 1971 and 1974. Of interest in the positioning of items in both surveys is the relatively low position assumed by "Job duties" in each (well after the item, "Skills and abilities needed" which may have served as a sort of surrogate) and the fact that the "Location of job" and its "Promotional opportunities" received relatively little emphasis from either group.

The message that high school students appear to be attempting to convey as to the way they wish to obtain information about jobs comes through loud and clear in both surveys. In each, the first choice given most frequently was actually seeing the work performed. And in each the first choice mentioned second most frequently was "working part-time or in summer." The young women emphasized this factor of going beyond the school's walls by placing in third and fourth place two choices that were not presented, or presented as clearly, in the Berkeley survey--through people in the occupation, and engaging in job-related activities. Thus, talks with counselor which had been the third most frequently given first choice in the Berkeley survey sank to fifth place for the young women, and reading about jobs (in fifth place in the Berkeley survey) slipped to eighth place for them.

The teacher's place in imparting career information was explored in greater detail in the survey of young women than in the Berkeley study. Receiving career information as part of the regular course, an option not offered in the Berkeley survey, as a first choice followed closely in popularity after talks with the counselor. However, world of work courses and talks with the teacher were chosen by fewer young women than any other means of communication except movies, film strips and TV which occupied last place.

Because of one question asked in this survey of 500 young women who scored at or above the 80th percentile nationally in the quantitative section of the 1973 PSAT, we can obtain perhaps a glimmer of the evaluations which young people with strong capabilities for science careers would give as to the content and delivery of career information.

The young women were asked, which of a number of items had most influenced their thinking about a career choice. (7) Beyond attributing the most important influences to what was within themselves (own interests, own abilities) the young women placed the more direct forms of experience (courses, activities, knowing someone in the occupation, and own work experience) at the top of what might be called "external factors."

Significant to efforts aimed at improving career information materials is the fact that when all four choices of important influences upon the thinking of these talented young women are taken into account, books and pamphlets were held to have shaped their career decision-making in larger measure than mother, financial considerations, father, teachers, relatives, grades or peers. Near the end of the list (contradicting McLuhan) were movies and TV programs, and following that item was physical capacity. Last of all was the counselor.

Moreover, when the impact of various influences upon career choice is examined in terms of their encouraging a career in science, the results of this study show 29 percent of the young women who are characterized as "science-bound" reporting that they were "very much" encouraged by books and pamphlets about occupations. Meanwhile 43 percent replied that they were "moderately" encouraged and 27 percent responded that they were encouraged "not at all." The significance of these percentages as to the importance of devoting attention to guidance materials for young people with strong capabilities in science can be appreciated by comparing the strength of this influence of the written word for the science-bound with that of other "external influences" about which data were collected.

The impact of counselors in influencing career decisions towards science was reported by 13 percent of these young women as "very much", by 34 percent as "moderately", and by 53 percent as "not at all."

Percentages given for the influence of fathers were close to those for counselors--15 percent, "very much"; 32 percent, "moderately"; and 53 percent, "not at all."

The interesting fact is that the impact of books and pamphlets in influencing career choice was regarded as "very much" by about twice the proportions of young women that attributed so strong an influence to counselors, fathers or mothers.

Unfortunately, none of the studies cited above could include a computerized Career Guidance system among the means by which career information is conveyed. Hence, none of these studies can provide us with data comparing this means of information delivery with other types, or shed light on the different reactions of differently oriented students to computerized information delivery.

Some of the evaluation studies considered later in the present report afford some insights as to student reactions in this respect. For the time being, we shall quote an observation of a leading developer of computerized systems that bears on one charge frequently brought against them:

> *"Students do not indicate any feeling of dehumanization and, in fact, more often tend to view a session at the computer as personal."* (8)

Conclusion

In this chapter we have emphasized that in designing guidance systems and programs and in assessing the content and delivery of guidance materials it is important to look to the needs and wishes of the students themselves. On the basis of somewhat slender evidence, we have indicated that there may be differences in the reactions of differently oriented student groups to different types of systems and influences.

Supporting at least our premise as to the necessity of consulting student wishes are the words of one expert with long and significant experience in systems design,

> *"Before systems can be designed to be more freely responsive to student information and career planning needs, a variety of factors will need further attention and research. Investigation should be focused on, first, determining the types of information students want and need to make informed career plans."* (9)

REFERENCES--CHAPTER III

1. Prediger, D.J., Roth, J.D., Noeth, R.J., Nationwide Study of Student Career Development: Summary of Results, (ACT Research Report No. 61) American College Testing Program, Iowa City, Iowa, 1973.

2. Ibid., p. 33.

3. Ibid., P. 11.

4. Thal-Larsen, M. and Nagarvala, P., A Survey of High School Students' Needs for Labor Market Information in Career Decision-Making, Human Factors in Technology Research Group, Department of Industrial Engineering, University of California, Berkeley, May 1971.

5. Laner, S. and Nagarvala, P., A Second Survey of Students' Needs for Labor Market Information in Career Decision-Making, Human Factors in Technology Research Group, Department of Industrial Engineering, University of California, Berkeley, October 1971.

6. Kirk, B., Factors Affecting Young Women's Direction Toward Science, Technology, Mathematics, Management Technology, Career Projects, Berkeley, California, 1975.

7. Ibid., pp. 96-99.

8. Harris, J., "The Computer, Guidance Tool of the Future," Journal of Counseling Psychology, Vol. 21, No. 4, July 1974.

9. Kroll, A.M., Computer-Based Systems for Career Guidance and Information: a Status Report, March 1973 (Manuscript prepared for publication in Focus on Guidance).

CHAPTER IV: OVERVIEW OF CAREER GUIDANCE PRACTICES AND MATERIALS

Introduction

Entire volumes directed ostensibly to providing a view across the extensive terrain of counseling practices fail to provide it in any quantitative sense through no fault--we are sure--of the authors. That is, the reader does not gain from these works a firm sense of the extent to which the practices described may dominate the field at the present time. This appears inevitable given the diversity of the selection and training of counselors and of the schools themselves which furnish the settings in which the various modes of Career Guidance are embedded.

As one author has written respecting our school systems:

> *"It is reasonably safe to assert that, somewhere in this country, it is possible to find an example of virtually every educational plan which has ever been devised by human intellect...the list of descriptive vectors could go on almost infinitely, with any particular school or program located in n-dimensional space, depending on its particular combination of descriptive coordinates. A simple description of the structure of education in the United States is no longer possible (if indeed it ever was) and educational planners are constantly at the task of shuffling the pieces of this enormously complex jigsaw puzzle that we call schooling in America."* (1)

Our own efforts to establish a quantitative framework for a consideration of the prevalence of various practices did not produce data which can be considered "representative" in the statistical sense. However, as a result of questionnairing individuals having various kinds of responsibilities related to the conduct of Career Guidance we did ascertain the existence of what can best be described as a "climate of opinion" on a number of relevant issues. The generalizations concerning Career Guidance practices and materials included in this chapter are largely derived from the opinions expressed by our respondents. Their replies as to specific practices will be reviewed at appropriate points in the Chapters that follow. Both types of responses. however, will serve as background for certain of our recommendations proposing action by the National Science Foundation.

The remainder of this Chapter will be devoted to outlining briefly the several areas that will be covered in subsequent parts of this section and in indicating the perspectives from which these areas will be viewed.

Questionnairing State School Officials*

The use of questionnaires to gather data for this study was tempting on two counts. First, the matter of providing effective guidance for science students receives little if any attention in the literature. Second, the charge of giving "an overview of current practices in Career Guidance all the way from the school with no guidance counselor to the sophisticated computer-based systems" carries at least some quantitative implications as to the prevalence of certain practices throughout the country.

At the same time we were warned by authorities in various quarters that the usual autonomy and diversity of local school districts would prevent many state school officials from providing valid quantitative distributions of the Career Guidance practices operative within their respective states. This warning proved justified as an indicator of which states would return the questionnaires . Of the fifty schedules dispatched to State School Superintendents in November 1974, only half were returned. However, those that were completed represent a respectable sampling of states by size and region. Yet we will not argue that the replies received from the state school officials who responded are sufficiently representative to be taken as a valid indicator of the frequency with which certain organizational modes, practices, and viewpoints are to be found throughout the country. It does seem justified, however, to assume that on a case study basis these twenty-five responses provide noteworthy insights into changing trends in guidance and reflect the current climate of informed opinion on various related issues and problems.

A "thumbnail sketch" of the most prevalent pattern of Career Guidance based upon replies from the twenty-five states participating in our survey would show that a two-to-three counselor high school is the norm. The largest number of respondents [12] indicated that schools with the most prevalent pattern of Career Guidance are to be found "throughout the state." Others [4] located them in small to medium-sized cities while an equal number specified that they are generally in medium to large-sized cities. The remainder [2] reported their most likely location to be in suburbia.

According to the largest number of respondents [8], "no particular theories" appear to underlie counseling practices in these most prevalent systems. But where a supporting theory was thought to exist, five respondents termed it "developmental" theory. Often, the influence of Career Education concepts and models was stressed in answer to our question as to the particular theories of career choice that might underlie the approaches to guidance practices customarily followed in the most prevalent patterns. A few respondents [4] were more specific, giving such names as Super, Holland, and Ginzberg as responsible, at least in part, for the theoretical underpinnings of the Career Guidance provided in their schools. References to trait-factor or behavioral theory were very few and when they were made, it was generally to state that these theories were rapidly giving way to developmental theory.

---

*See Appendix pp. IV-1 to IV-9 for a full report of the findings resulting from this questionnaire. These findings, sequenced to accord with the survey instrument, show the interrelationships among certain elements in the thinking of our respondents and the reasons supporting the conclusions which they reach that are lost when their replies are presented by subject matter area.

A general question about the techniques other than conventional counseling employed in delivering career information found one-third [8] of the respondents associating the use of visual aids, VIEW decks, film and film strips with counseling as practiced in the most prevalent pattern of Career Guidance. An equal number referred to the incorporation of occupational information in the curriculum in addition to the use of visual aids. A few [3] spoke of some computerization of the occupational information available to some of their secondary school students. The remainder were silent as to the use of special delivery techniques.

For the most part, the gifted student (including the student with strong capabilities for entering science, mathematics and technology) was reported as not receiving special career attention in the guidance program. And when he does receive such attention it may be that this concern is expressed in no more concrete fashion than "the gifted student is given assurance that he is not ignored because he is doing well." However, ten respondents did describe more specifically the attention that is given to students with strong capabilities for entering careers in science, mathematics or technology.

The largest number [4] maintained that such students automatically receive more career attention than others because "traditionally they get more help." College and employer representatives appear at the high schools; special materials concerning occupations in science and technology are in the resource centers; there are many jobs in these fields to attract the interest of such students. Almost as many respondents [3] equated this special attention with various forms of special courses--advanced courses in mathematics and science, intern programs, advanced placement and "mini-courses." Two school officials replied that these students are still receiving the special attention that was created for them under the provisions of the NDEA, while one believed that because of their many talents and interests these students (likely to have real decision-making problems because of their multi-potential) receive more attention because they seek it out.

It should be of some interest that what were described as the more developed systems of Career Guidance were not necessarily, nor even most often, characterized as those possessing more resources, lower student/counselor ratios, better trained counselors or more elaborate facilities than the most prevalent systems. The model of the more developed system that emerged (and which apparently served our respondents as the criterion of a "good" system) is one with a high degree of coordination between guidance and curricular offerings. Career Education concepts and modes are much in evidence with strong emphasis upon such features as teachers "serving as the front-line guidance resource"; a heavy involvement with community resources including opportunities for exploratory work experiences; career centers, and possibly such added items as a school-administered placement service, a Career Guidance Curriculum Coordinator, and a higher than average availability of computer facilities and audio-visual media.

As was true of responses regarding the geographic location of schools having guidance services of the most prevalent type, the largest number again located their more developed category throughout the state. However, the remainder split about evenly between placing it in large cities and in suburban areas. Only two respondents reported that these more developed systems are located most often in medium or moderate-sized cities.

In the more developed systems, gifted students, including those oriented towards science careers, appeared to enjoy a slight advantage as to special career attention over the same type of students receiving guidance in the majority of schools. In that minority of cases, even in these more "developed systems" where such attention is given, it is said to result from the fact that "guidance, in general, is college-oriented, reflecting the academic bias of counselors." To the extent that special attention is given, it generally takes the form of provision of an advanced curriculum, intern programs, or advanced placement. Very seldom does it follow the Career Education model of job exploration for the gifted.

The less developed patterns of Career Guidance were usually described as systems characterized by a lack of resources manifest in limited personnel and time for guidance, high student/counselor ratios, poorly trained counselors and very few support services. Those respondents who went on to elaborate upon what follows from this generally lower level of sustained benefits and less reliable delivery systems, often edged nearer to their earlier expressed criterion of a "good" system. They saw in this less developed pattern little or no use of Career Education concepts. Thus, there is likely to be no integration of guidance in the curriculum, few opportunities for structured work experience, and few career centers.

The greatest degree of unanimity concerning the geographic location of schools providing a specific mode of counseling was shown, not unexpectedly, in the nineteen replies stating that the less developed category of Career Guidance is generally to be found in the rural areas. Of the remainder, three held that such schools are spread throughout the state while two placed them within the inner cities of highly urbanized areas.

As to the special career attention that might be given science-oriented students in this less developed pattern of guidance, a majority [13] of the reporting respondents believed that it would not be provided. Six of the eight who thought that such help would be forthcoming spelled out why they surmised it would be available. Some maintained that as counselors possess an academic bias, they are likely to provide such students special help. Others pointed out that more resources exist for these students, such as specially funded programs. The remainder stated that special attention is automatically provided to all the college-bound.

Possibly more disturbing to those seeking to improve the Career Guidance provided to science students than the dismal account of the attention they now receive was a current running through the responses that is hard to isolate and describe. As part of our questionnairing we asked the state school officials whether or not they believed that special provisions are needed and should be made for the Career Guidance of gifted students, particularly those with strong capabilities for entering occupations in science, mathematics or technology.

The majority [14] of the twenty-one state school officials answering this question took the position that the guidance system should speak to the needs of all students and be generally adequate. There were several statements to the effect that all students need guidance and that it must reach all students. These can only be accepted as exemplary statements. However, there was the implication in some of these answers and in the comments of other respondents that even to have asked about special career attention for these students was to have assumed an "elitist" position.

The seven who believed that special provisions are needed for the guidance of gifted students, especially science students, represented a rather broad range of thinking on the subject. One respondent took the position that such students should "definitely be included" in efforts to provide adequate guidance to all students, and there was the implication that it would require special provisions to ensure their inclusion. Others aligned themselves with the respondent who wrote that "The gifted should be a more important part of Career Education." Yet others believed that "Counselors need to have more accurate information about employment opportunities for the gifted, as well as better educational information for them." And, finally, there was the respondent who believed that these students should receive special career attention but who added, "Special attention wouldn't be possible for them now in this state."

It definitely appears that there is a less than favorable attitude towards occupations in science and technology in various quarters of the counseling profession. This attitude stems from such assumptions as that giving the specialized career attention to students having strong capabilities for entering careers in these fields violates egalitarian philosophy or that the future labor market for scientists and technologists is too uncertain to warrant the long training time required for entry. If such attitudes are as widespread as we have reason to suspect, the development of factual data to disclose their extent and to refute the assumptions upon which they are based should appear high on the list of priorities.

A review of these questionnaires reveals two other general areas where action appropriate to the National Science Foundation should be considered. Scattered comments throughout the questionnaire regarding computerized records management and the computerized delivery of career information would speak for continued Foundation support of research and experimentation in these areas. To be sure the sentiment was sometimes voiced that "computerized guidance is inhuman." However, more of our respondents tended to equate the use of mechanical assists and visual aids with the "more developed" Career Guidance systems and to acknowledge the assistance these products of modern technology can give to the human counselor.

Two points were about evenly mentioned by the state school officials with regard to needed changes in present methods of storing, retrieving and delivering occupational information. One group advocated the extended use of computerization, data banks and audio-visual aids--all within the scope of Foundation expertise and interest. The other group emphasized Career Education concepts and maintained that occupational information is best delivered by "infusing Career Education into the curriculum, using teachers as the delivery agents." This latter view has a bearing on National Science Foundation efforts to improve science education and guidance; for although unquestionably a current enthusiasm among educators, Career Education is lagging in its application to preparation for the higher level occupations. Whether or not this lag represents a short-changing of science students insofar as the Career Guidance they receive is concerned should be thoroughly explored as soon as it is possible to do so.

Questionnairing Research Chiefs of State Employment Security Agencies*

At first glance it might seem a bit strange to submit the research chiefs of the fifty State Employment Security Agencies to the task of completing a questionnaire in connection with a study of Career Guidance. These officials, however, occupy critical posts in what might be called the existing (but far from designed) "system" of labor market information that now exists. An enormously complex and costly apparatus of personnel and procedures--federal, state, and local; public and private--does function to produce and disseminate a many-faceted and multi-purpose body of information whose components are interrelated as to source and processing, and whose products are destined for a variety of users.

One type of information that should emerge from the operations of this complex apparatus or system is sound, reliable Occupational Information. And to be useful in the process of Career Guidance there must be that sound local information with which state officials are concerned as well as national information concerning occupations. But, as Occupational Information is but one output (and probably the least developed) of the entire system, the successful functioning of the whole as well as of this one part must be taken into account in any consideration of the data base supporting Career Guidance. Thus, many of our questions directed to the state chiefs were broad-ranging and focused on the system in its entirety (e.g., questions concerning the use of national matrices covering all occupations) while others addressed more directly the subject of this study (e.g., reporting problems with local establishments hiring in science occupations).

A second reason that we believed it essential to contact these officials stemmed from the growing realization that the encountered system of producing and disseminating labor market information is not functioning satisfactorily and that, although much effort is being devoted to its improvement, much assistance from many quarters will also be required before an improved performance can be achieved.

To illustrate, in its first report issued in February 1975, the National Commission for Manpower Policy addressed the current status of labor market information directly and concluded that:

---

*See Appendix pp. IV-11 to IV-18 for a full report on the findings of this questionnaire.

> *"The labor market and related information which are available for allocating funds, programming and the general operation of manpower programs on a local basis are inadequate."*

The commission presents this deficiency as one of the major manpower challenges of 1975 and states that:

> *"A greatly expanded analytical and technical effort, supported by additional financial resources, is required if the Nation is to understand and improve the operation of its local labor markets."* (2)

This labor market information which is labeled as "inadequate" for manpower programs on a local basis is sometimes the same and at other times is closely related to that which is also needed by education planners concerned with the development of programs and curricula and also by counselors assisting students with the problem of career choice. Thus, it appeared more than justified to us to approach these research chiefs for the information they could supply as to current developments respecting the provision of labor market information, both of a general sort and as related to our specific interests.

Our questionnaire, sent out in November 1974, brought in a return of forty-five schedules, a 90 percent response rate. Those research chiefs who did not complete the schedule pleaded too heavy a work load or else they referred to the throes of reorganization.

The questions asked of them were oriented towards obtaining a picture of the state agency's current output, the program areas where the research chiefs were experiencing difficulties, and their suggestions as to needed actions to alleviate these difficulties and also to improve the guidance materials for science occupations.

Their responses went a long way toward clarifying why their counterparts in education, as well as those designing, operating, or using various of the computerized guidance systems, are so mixed in their reactions concerning the data provided (or not provided) them by State Employment Security Agencies. There is obviously tremendous variance in the amount and kinds of assistance which the state agencies are presently able to give to those seeking their help.

At the same time, it was plainly apparent that the state agencies are playing an essential and substantial role in the production of Occupational Information despite the existence of many problems. Almost half of them are currently issuing Occupational Guides (or less ambitious productions called Job Briefs) which describe various job requirements, the needed worker characteristics and, usually, the employment outlook. But the great majority of chiefs reported that the information in these publications could not be localized beyond the state level and that slender resources were hampering satisfactory revision schedules and the expansion of their present occupational coverage. Lack of adequate resources was also blamed for their difficulties in gathering sufficient descriptive material concerning occupations to allow their real localization and, incidentally, to permit more attention to a delineation of the "life style" associated with an occupation--a feature much stressed both by guidance experts and by student users of these materials.

When we asked about descriptive information concerning occupations in science and technology, the replies showed that most of the state research chiefs did not regard the problems associated with describing these occupations as substantially more serious than the difficulties attending the preparation of information on nonscience occupations. Where specific problems were mentioned, they related to the inadequacy of Employment Service data respecting these occupations as such workers are not commonly served in the local offices. They also referred to the current policy of concentrating Guide preparation on less demanding jobs at the expense of higher level jobs and to the difficulty of relating academic specialization to specific industries and occupations.

In the production of Occupational Information, the statistical substructure that permits making employment estimates and projections by occupation is of equal or greater importance than descriptions of jobs and worker requirements. Here, too, a mixed picture was presented by our respondents showing needs for greater resources including both technical assistance and funding. Nevertheless, and despite the legion of difficulties mentioned, the responses to our questionnaire did indicate more activity in releasing occupational employment projections that are used for Career Guidance in the secondary schools than was reported in connection with descriptive materials such as Guides and Briefs. Various assists from the Bureau of Labor Statistics, the Manpower Administration and the Bureau of the Census have enabled the large majority of the states, many in the recent past, to issue occupational projections that are available to the secondary schools in various forms.

In answer to our question concerning difficulties specifically related to making employment projections for occupations in science and technology, nineteen respondents stated that these problems were no greater than the many involved in constructing any other projections. However, five said that there was a specific lack of knowledge of the industries employing these workers, and four complained of limited data input from federal establishments in aerospace and defense. Again it was mentioned that these occupations are not prominent in Employment Service operations. Taken together, several respondents referred to difficulties in obtaining information about federal contracts; the fact that use of census data precludes obtaining information on new and emerging occupations; and that it is particularly difficult to develop occupational change factors for these occupations at the state level.

The services provided by the state agencies to those concerned with Career Guidance in the schools are by no means confined to the production and dissemination of conventional guidance materials. Twenty-four of the research chiefs replied that their agency had specifically assigned one or more of its employees to maintain liaison with state or district school officials in connection with Career Guidance in the secondary schools. Nineteen replied they knew of no liaison arrangements and two referred to informal relationships bordering on the official. But at the same time various problems were listed as impeding adequate liaison with the schools. Mentioned were the lack of resources which allegedly hinders the achievement of continuing communication; the difficulty of reconciling Office of Education and Department of Labor codes; the problem of constructing a sufficiently current picture of local labor demand, and inadequate coordination between top-level Employment Service and school personnel as to the production and dissemination of information to the secondary schools (including the problem of incompatible hardware).

A few respondents stated that they were playing a significant role in the Career Guidance Centers now being established in some of the states. However, fifteen reported furnishing only a modest amount of data to large scale, designed Career Guidance systems serving secondary school students. For the most part, the assistance furnished amounted to providing occupational projections, reports of job openings, Guides and other materials. In a very few instances, Employment Service personnel were reported as serving in an advisory capacity on the governing bodies of these systems or that the agency had entered into a consortium arrangement to supply occupational information for the system.

Responses to this questionnaire brought into focus various areas (which will be little more than touched upon at this point) where National Science Foundation involvement could contribute significantly to the improvement of guidance materials available to science students--and, in some instances, to all students.

Through the questionnaires we obtained overwhelming evidence that the state research chiefs lean heavily on the output of the Bureau of Labor Statistics national office and in many cases on the assistance of regional office Bureau of Labor Statistics and Manpower Administration personnel. In fact, the image of an inverted pyramid resting precariously upon its apex emerges clearly from their responses and comments respecting needs for greater assistance in the preparation of both descriptive and statistical materials. So far as occupational information of a descriptive type is concerned, the Occupational Outlook Handbook together with the Quarterlies followed by the DOT is clearly the mainstay of their production of occupational information as it also is for other producers of occupational materials. Thus, assistance with the potential for producing the largest impact upon the narrative materials utilized in Career Guidance would indubitably be supplied by any support or assistance furnished to the relatively small Bureau of Labor Statistics unit engaged in producing the Handbook. The same can be said of assistance furnished to the relatively small unit in this agency assisting the states with their employment projections.

Many of the problems impeding the localization of employment data and also liaison with the schools are as much technical where National Science Foundation assistance might be helpful as they are budgetary.

A very large step forward in improving the capacity to disseminate career information is represented in the Department of Labor's National Occupational Information grants program which evoked enthusiastic comments on many of the questionnaires. National Science Foundation input to this program could be of real benefit to future science majors.

Delineation of Current Guidance Practices

The remainder of this section will be devoted to answering more specifically the question, "What Career Guidance do students receive?" In describing the practices constituting this guidance, we have selected a method of organizing our material that will likely strike some as denoting a firmer categorization into types of practice and components of systems than is realistic or intended. It is well to recall the opening quotation of this chapter to the effect that infinite permutations and combinations of practices are evident in the composition of our school programs. An equal degree of diversity is also to be found in the guidance programs of these schools. Thus, we have no "pure types" of guidance programs under which we may arbitrarily subsume given sets of practices. And, as indicated earlier, we have little firm evidence with which to describe some programs as "most prevalent" while others can definitely be considered as "more developed."

In order to avoid a sequencing of our material that would amount to no more than loosely stringing together an assortment of various practices, we will take a lead from the school officials' questionnaire responses described earlier in this chapter.

Within what was termed the "most prevalent" practice, we detected a form of guidance representing a wide range of practices that we have gathered together under the rubric of "counselor-based guidance." Reduced to its barest essentials this form of guidance might consist of a single counselor assisted by a poorly stocked and seldom used library of guidance materials. At the opposite end of the spectrum we could expect to find a counselor aided by various other members of the school staff including teachers and paraprofessionals, his efforts further bolstered by a career information center, use of audio-visual aids, and a significant access to community resources. Somewhere in passing through the various combinations of theory and practice that could comprise a school's guidance program the line is crossed (if the theoretical underpinnings of these practices warrant the distinction) from what might be called "Vocational Counseling" administered on a very modest basis to "Developmental Career Guidance," provided in a "Comprehensive Guidance Program."

Thus, the chapter includes descriptions of the various separable practices associated with counselor-based guidance however they are assembled and no matter what undergirding in theory they may possess in a given school's guidance program. Recorded along with these descriptions are the criticisms most commonly leveled at the various practices described.

It may be recalled that the school officials' recommendations for improving current guidance practices were about evenly divided between a "strong infusion" of Career Education concepts and the computerization of career information delivery. The two chapters following next after that on counselor-based guidance describe these two aspects of affording guidance.

We recognize the difficulties and ambiguities that result from attempting to establish a dividing line between Developmental Career Guidance and Career Education in that several practices utilized in the former are, indeed, the very tools of Career Education. Nonetheless, the inclusion within Career Education of a curriculum content designed to ensure the student's capability for employment or admission to further education, and the counselor's changed role do permit a differentiation despite their several commonalities. We are aware, further, that in some quarters the implication that Career Education is a form of guidance rather than that guidance is an arm of Career Education would be regarded as heretical.

The subsequent chapter on computerized guidance describes the major systems of this type that are now operational and compares such of their features as means of access, data base, delivery systems and performance.

Finally, as our comparatively recent technological capabilities for delivering career information have quite obviously outstripped our abilities to produce it, the final chapter of this section is devoted to considerations of the current state of the art and of procedures in the matter of this information's data base.

Each of these chapters will include, to the extent possible, the significance of what we have discussed for the guidance of science students, and also the general areas where National Science Foundation action might be appropriate.

Conclusion

The foregoing "overviews" of Career Guidance practices have included those contributed by two groups of individuals, important in the conduct of Career Guidance. From the responses of a group of school officials we can gather some notion of the variety of practices that can currently be considered as prevalent in the field. Moreover, we learn what other practices they would consider as representing an improvement in the Career Guidance which can be provided to students. From another group of respondents, the State Chiefs of the Employment Security Agencies, we have acquired some insights into the problems besetting production of the satisfactory stock of career information required to support a Career Guidance system.

These responses, also, have pointed a way to organizing the chapters that follow in this section. After describing the various practices which appear to be prevalent, even if not "most prevalent" at this time, we shall continue with two major variations on the theme of Career Guidance--Career Education and computerized guidance systems. In the final chapter in this section, we will explore the matter of data base--of profound importance to the excellence of Career Guidance, no matter what practices are employed in its provision.

REFERENCES--CHAPTER IV

1. Lathrop, R., "The American Educational Structure," in Herr, E.L., ed., Vocational Guidance and Human Development, Houghton Mifflin Co., Boston, 1974, p. 182.

2. National Commission for Manpower Policy, The Challenge of Rising Unemployment, Report No. 1, Washington, D.C., February 1975.

CHAPTER V: COUNSELOR-BASED CAREER GUIDANCE

The Guidance Counselor

For more than a decade those engaged in vocational guidance have been undertaking an agonizing reappraisal, and the professional literature is replete with withering self-criticism. A few representative statements by leading authorities in the field reflect the prevailing climate:

> *"It has yet to be demonstrated that career guidance practices and their main purveyors, school counselors and teachers, make a significant difference in the vocational development of youth."* (1)

> *"Counselors try to perform jobs that are patently impossible; they are too few; there is a bewildering plethora of activities they perform; the misperceptions of the work they do are staggering; and they themselves are unsure of what they are about."* (2)

Hansen and Borow (3) have provided what is perhaps the most detailed catalogue of the shortcomings of counselor-based guidance:

> *"Among the circumstances which attest to the inadequacy of present day practice are the following:*
>
> a. *The time available to school counselors for direct work with students is severely limited.*
>
> b. *Students often hold a narrow and outmoded conception of career guidance and are ill-prepared to benefit from it.*
>
> c. *Counselors and students characteristically overemphasize the problem of specific choice and undervalue the developmental and motivational aspects of planning.*
>
> d. *Counseling often proceeds on the single-job-for-life assumption rather than upon the premise of a sequence of choices within a career.*
>
> e. *Testing and test interpretation are overemphasized.*
>
> f. *Job content (formal duties) of occupations is overstressed at the sacrifice of the psychosocial and life style characteristics of occupations.*
>
> g. *Inadequate linkages exist between counseling and education, training, placement, job adjustment and follow-up.*

> h. *Short-term "crisis counseling' is given disproportionately heavy emphasis in guidance work with high school and college students.*
>
> i. *Disproportionately heavy emphasis in high school is devoted to counseling the college bound, with too little emphasis given to the work bound.*
>
> j. *Relatively few students cite counselors as having an important influence upon their career planning.*
>
> k. *Evaluation studies on the outcomes of career counseling have been few, and those which are available do not provide much support for the effectiveness of counseling. However, better designed studies showing more favorable results are beginning to appear.."*

An important consideration is the extent to which the school counselor is typically involved in Career Guidance activities. In a survey of nineteen public high schools in the San Francisco Bay Area in 1968 (4) it was reported that 18 percent of the counselors' workload was related to "planning job futures" (assistance to students in educational-vocational planning and decision-making). Using a somewhat different definition, Campbell, (5) in a 1968 survey of 308 secondary schools throughout the nation, reports that 10 percent of counselor time spent with students was related to problems of "vocational program selection." In a 1974 survey of eight high schools in the San Francisco Bay Area, (6) counselors estimated that only 9 percent of their time, on the average, was allocated to "vocational counseling". In view of the narrow terminology used, it is possible that the latter two studies understate to some degree the amount of time devoted to all aspects of Career Guidance, and an unknown fraction of the time reported as spent in college advising and high school programming could conceivably be related to career planning.

Finally, in the questionnaire which we directed to state school officials, two-thirds of the state respondents estimated that the most prevalent condition was that 30 percent or less of counselors' time was devoted to "assistance to students in educational-vocational planning and decision-making", the same definition used in the 1968 San Francisco Bay Area survey.

The figures derived from the above studies are not comparable because of the differing definitions and terminology used, and perhaps to some extent because of the nature of the respondents and the degree of their proximity to the counseling site. However, they all lead to the inescapable conclusion that school counselors devote a minor portion of their total time and attention to matters of Career Guidance.

The two surveys conducted in the San Francisco Bay Area (1968 and 1974) report that major amounts of counselor time were expended on college advising and high school course programming--activities which, if undertaken with career development concepts in mind, could partially qualify as Career Guidance services. Another activity, usually more significant in time expenditure than Career Guidance, was assistance to students on personal and social problems.

This is not surprising, considering the direction in which school counselors were moving in the 1950's and 1960's. Increasingly, concerns were being expressed for the necessity of meeting the developmental needs of the "whole person" and of dealing with the emotional, social and other life adjustment problems of adolescents in a therapeutic manner. Apparently many practitioners embraced this thrust with enthusiasm. In their search for a suitable definition of their role in the educational establishment, they perceived this role as providing greater professionalism and the higher status of the counseling psychologist. No occupational group, of course, has complete control of its own destiny, and this direction may have been somewhat reinforced by the concerns of school administrators, parents, and the public, but certainly by counselor educators and trainers who were enamored of the medical model.

Some authorities decry this trend, and argue that "educational and occupational guidance be made the primary commitment of the profession. This recommendation seeks to bring guidance back to its origins." (7) Others strongly opt for therapeutic client-centered counseling as the appropriate role of the school counselor, and propose that he be relieved of responsibilities for Career Guidance services, which would be assigned to an educational, vocational and social information specialist. (8)

We are not qualified to say whether the typical secondary school guidance counselor spends too much or too little of his time and attention providing psychological counseling services. It may well be that emotional, personal and social problems, which occur with frequency during adolescence, need to be dealt with before many students are mature enough to become planful about their career goals, and the resolution of such problems may be a primary concern of students, parents, and the community. Perhaps the school counselor's role should be that of referral to other community resources, rather than attempting to deal directly with many of these problems. Mention is made here only because this is another influence which diverts the counselor from playing a larger direct role in the career development of secondary school students.

Repeatedly mentioned also is the heavy caseload which prevents counselors from giving sufficient attention to the needs of students, including those for Career Guidance. In 1962 C. Gilbert Wrenn (9) concluded from a review of experiences that 300 students per counselor was a reasonable standard. This ratio has long been accepted by the leadership of the American Personnel and Guidance Association, as well as by many school administrators, as a rule-of thumb goal for staffing the counseling function. The desirable ratio may be substantially lower. In his 1968 survey, Campbell (10) reported that counselors, principals, students and parents viewed the "ideal" caseload as between 200 to 250 students per counselor. The actual situation, as reported to him by a sample of 264 counselors, was that 70 percent had caseloads in excess of 300, and the median figure was 380. (11)

In the 1968 study of nineteen high schools in the San Francisco Bay Area (12) the average number of students per full-time counselor was found to be 344. It was approximately the same (334) in the eight high schools surveyed by Barbara Kirk (13) in 1974. The Bay Area may be in a fairly fortunate position in this respect. A 1969 survey by the California School Counselor Association showed a mean pupil-counselor ratio of 468 in secondary schools in the state. (14) In our questionnaire to state school officials, 75 percent of the respondents estimated that the most prevalent pattern was in excess of 400 to 1, and nearly a third reported ratios of more than 500 to 1.

The Department of Labor's Committee on Specialized Personnel (15) in 1967, and Ginzberg (16) in 1971, considered what would be required to increase the supply of counselors in order to reach the desired staffing goals, and the resource implications were staggering. In view of the increasingly critical nature of school financing today, these goals may be even more unrealistic now than they were several years ago.

At the risk of over-generalizing, then, it can be concluded that because, in the predominant pattern, the counselor can see the majority of students only infrequently and for very limited periods of time, and then for many other pupil personnel concerns beside vocational counseling, the one-to-one counseling process cannot be relied upon as the major vehicle for the delivery of Career Guidance services. (17)

Moreover, the growing recognition of the dynamics of the development of vocational maturity elevates the question to a different level. In earlier simplified applications of the trait-factor theory, in which career choice was often regarded as a one-time event, it was possible to feel comfortable with the notion that the counseling process could provide what was needed. This formulation is no longer tenable when career choice is viewed as a developmental process, proceeding sequentially at various stages of vocational maturity, requiring the provision of many kinds of information and experiences, as well as training and practice in decision-making, and all occurring throughout the period from childhood into adulthood.

This dynamic concept, now overwhelmingly accepted in the literature and in the practice, has radical implications for change in the way guidance services are provided and for the role of the counselor. It calls for a vertical integration of Career Guidance throughout the curriculum as well as for horizontal integration and coordination with other school staff and community resources.(18) Yet current practice lags well behind present knowledge of the nature of career development. It is safe to say that in the great majority of secondary schools, Career Guidance is counselor-based, and is incidental to the total pupil-personnel program.

Case Studies of Guidance Practice

It is not possible to characterize the "typical" school guidance program in terms of the resources, practices, or organization of Career Guidance services. Programs vary by state, by school district, even by individual school. The difficulties we encountered in our attempt to get rough characterizations of "most prevalent" and "least prevalent" practices by questioning state school officials are described in Chapter IV. From our interviews with counselors, we have selected two schools, considerably different in size and setting, as illustrative. They are not necessarily typical; they may represent guidance programs of well above average quality for schools operating in similar circumstances.

School "X"* is located in a predominantly agricultural area and serves a semi-rural county seat with a population of approximately 4,000. It is a four-year high school with an enrollment of around 500 students. There is a single counselor, who also supervises the paraprofessional in charge of the Career Guidance Center.

The counselor does all scheduling and programming and thus sees all students at least once a year for ten to fifteen minute interviews. She also holds special interviews with all graduating seniors, advising them of their grade point averages and discussing their plans with them. Better than 40 percent go on to college; probably 15 percent complete a four-year college education. The counselor administers the testing program.

The Career Guidance Center is located in a trailer adjacent to the school. It is equipped with two film strip projectors and one movie projector; there are the usual federal publications (OOH and DOT), state Occupational Guides, one subscription to SRA and "Careers" materials, and much free literature. Students drop in voluntarily or are referred by teachers or the counselor. The Center is also used for student meetings with recruiters for colleges, the armed services, and employers.

The regular academic program includes courses in science and mathematics, but there are no advanced placement courses. The counselor believes that a student with strong capabilities in science would receive some attention from local colleges; some science-oriented students have been invited to "look over their courses."

The vocational program includes courses in agriculture, drafting, and power mechanics. In addition, the tri-county ROP (Regional Occupational Program) funds courses in auto mechanics and hospital work at School "X"; in agricultural equipment operation and business occupations at one nearby high school; and in horticultural and culinary occupations at another. There is also a work experience program in which about seventy-five students are enrolled.

The counselor works closely with the teaching staff and the Work Experience Coordinator and there appears to be a growing attempt to bring vocational development into the curriculum. Some years ago a "world of work" unit was included in the social studies course, but then dropped. Now, under the impetus of Career Education concepts, some progress is being made in integrating vocational information in the curriculum. In the 9th grade, some information is given on job families, followed in the 10th grade by attempts to relate individual interests to occupations. In the 11th grade, role-playing is used to simulate job interviews and applications for work. Information on employment outlook is conveyed in the senior year.

School "X" enjoys a high degree of community cooperation. The Rotary and Kiwanis put on an annual Job Fair. Local executives from industry and government make themselves available for interviews with students interested in specific occupations and industries; they also assist in the role-playing simulations of job-seeking.

---

*See Appendix, pp. V-1 to V-4 for Interview Report (Counselors) -- "X" High School.

School "Y"*--two thousand miles distant--is a four-year comprehensive high school serving a suburb of a major metropolis. Although it is primarily a residential area, it has a small amount of light industry. The area served by the school has a population of approximately 45,000. A high proportion of the students come from well-to-do families of college-educated parents, mostly professionals and business executives. There is a smaller percentage of first-generation children of European immigrants. There is a minimal representation of racial minorities-two to three percent each of Blacks, Orientals, and Chicanos. The latter group is the most disadvantaged in terms of economic status and language facility. The school's enrollment is 2,700, with a graduating class of 670. Eighty-six percent of the school's graduates go on to some form of post-secondary education, with 77 percent enrolling in a four-year college or university.

The Counseling Department consists of nine full-time counselors, a college consultant, a career consultant who is responsible for testing and placement services, and a paraprofessional who is the coordinator of the Counseling Resource Center. This staff is supplemented by two social workers, a work experience coordinator, a part-time psychologist and a visiting psychiatric consultant. Each of the nine counselors is assigned students from the four class levels, and the student-counselor ratio is approximately 300 to 1.

On the average, a student will see a counselor six or seven times per year, usually on the student's initiative. Group sessions are also used extensively, particularly for college and "futures" exploration and planning. It is estimated that counselor time is allocated in equal amounts to three major functions: academic programming; personal adjustment problems; and college and future planning.

The Counseling Resource Center is located in a large room adjacent to the counseling offices and is readily accessible to students. It was in active use during our visit. Its well-stocked book shelves include occupational materials from all of the major publishers, both public and private, as well as a wide-ranging library of college catalogues from all parts of the country. File drawers contain an extensive collection of pamphlets, leaflets, and magazine and newspaper reprints of career information materials. Audio-visual equipment and materials (films, audio and video tapes) are available in the Instructional Media Center in another part of the building. There is a teletypewriter terminal in the Counseling Department offices, tied into a computerized system for the delivery of occupational and educational information.

In addition to the standard secondary school offerings, school "Y" has special courses in Child Development, Computer Technology, Drama, Ecology,

---

*See Appendix, pp. V-5 to V-8 for Interview Report (Counselors) -- "Y" High School.

Psychology and Behavioral Science. Advanced placement courses are available in science, mathematics, English, foreign language, and social studies at the senior level.

Approximately 200 students are enrolled in cooperative education programs in industrial, office, distributive, home economics, and science-related occupations. The science program was started in the current academic year and is still in the formative stage. Additional vocational training is available at a nearby Area Vocational Center.

A student placement service is operated under the supervision of the Career Consultant, offering temporary and part-time jobs, as well as some placement of terminal students.

Career Education concepts are receiving increasing attention. A faculty committee is developing approaches to making teachers aware of sources of career information and encouraging them to include career planning in their work with students.

A series of career days is held each year, bringing in guest speakers and other resource persons from the community. During the last year there were career days in foreign languages, home economics, science, engineering, and the arts. Parent volunteers are extensively used for lectures, tutorial help, and assistance on enrichment projects.

The Career Center

During the past four years there has been a movement in a number of school districts to establish within the high school a centralized, easily-accessible location of vocational guidance services, especially guidance information functions. Often staffed by paraprofessionals, such centers provide significant relief for the counselor from the tasks of organizing, maintaining and disseminating a broad range of informational materials about occupations, education and training resources, and related career exploration subjects.

These centers have a variety of characteristics. Some are essentially occupational libraries, others form the hub of the total vocational guidance service of the school, including counseling, testing, work experience and placement. They may be called Career Guidance Centers, Career Education Centers, Counseling Resource Centers, Career Development Centers, or Career Information Centers. Even when they share the same name they may differ considerably from school to school.

Two-thirds of the state school officials who responded to our questionnaire reported that Career Guidance Centers were part of the "most prevalent" pattern of organizing guidance services in their high schools. In California there has been a rapid growth of this concept since 1971, and a recent study by Thomas J. Jacobson (19) identified over 320 schools in that state as having career centers as of February, 1975.

In his study, Jacobson classifies these centers into four categories, or levels of development. Level one are those operational for less than a year, and therefore considered to be still in the formative stages. Twenty-six percent were classified as level one centers.

Level two are esentially Career Information Centers. In addition to maintaining materials and assisting students to find information, this type of center often coordinates such activities as a guest speaker program, group orientations to the center, and the administration of interest tests. Forty percent were classified at this level. They are usually staffed by a paraprofessional, with clerical assistance.

In the level three type of center "the concept of career development as a process begins to emerge." In addition to the activities described above, these centers attempt to engage students in the career decision-making process and to maintain continued contact with them. They are often staffed with a counselor and a work experience coordinator in addition to paraprofessional and clerical support. A class-wide orientation through a social studies class is commonplace, and emphasis is placed on working with the teachers. Thirty-two percent were classified at this level.

The highest stage of development, level four, accounted for only two percent of the centers surveyed. These are considered "full service centers" with more elaborate programs and staffing, and are well integrated with all of the guidance and educational functions of the school. They are usually staffed by two or three full-time professionals and two or more paraprofessionals, with additional participation of other counselors on a rotating basis.

Center staff consider the provision of career information to be the foremost priority, and the centers are generally well-stocked with a wide range of printed and audio-visual materials. On the whole, printed materials are used more often. Two-thirds of the students reported that they referred to pamphlets or books about careers or groups of careers, slightly over half reported using loose files of career information and college catalogs, and slightly less than half said they used the Occupational Outlook Handbook, career magazine, or career workbooks. (20)

For all the categories of printed information, 55 percent of the students used them at least once during the school year. For all of the audio-visual materials, including soundstrips, cassettes, micro-film, filmstrips, and VIEW, the figure drops to one-third, ranging from 40 percent for filmstrips to 26 percent for VIEW.*

This lesser use of audio-visual materials may relate to the accessibility of equipment and to problems of operation of equipment, as much as to actual student preference for printed materials. Jacobsen does refer to findings that younger students (grades 7-10) prefer films, but then points out that the attraction of printed materials increases by grade level and by the

---

*For a more complete description of VIEW, see Appendix pp. V-9 to V-14, report of VIEW National Conference, El Paso, Texas, May 28-30, 1975.

"ambitiousness" of the student's educational plans.

Teaching Decision-Making

Considerable interest, even some excitement, has been generated in recent years by the idea of developing a curriculum model on career decision-making, on the assumption that decision-making is a teachable skill. This is in response to a widely-expressed need by guidance personnel, who consider it an important component of career planning, having learned from many experiences that students often lack the ability to apply knowledge in making decisions, and that information does not necessarily lead to planning. Much of the impetus for development in this field has been provided by the growing literature on behavioral counseling.

Perhaps the earliest decision-making curriculum was "You, Today and Tomorrow", a program for group guidance sessions developed in 1959 by Martin Katz, and published by Educational Testing Service; it is considered to be a landmark in Career Guidance. (21)

Another early decision-making curriculum was the Deciding program, developed by H.B. Gelatt, Barbara Varenhorst and Richard Carey, and available from the College Entrance Examination Board. (22) In 1974, the CEEB also published Decisions and Outcomes, by the same authors. Both of these materials have had fairly widespread sales. Another well-known curriculum aid is the Life Career Game, developed by Coleman and Boocock, which has attracted a good deal of interest in educational circles. (23)

Katz, probably the foremost theoretician and researcher in this area, has incorporated computer-assisted training in decision-making in SIGI, and other computerized systems such as ECES and DISCOVER are including this component in their software. (See Chapter VII for descriptions of these systems.)

The Appalachia Educational Laboratory has been developing a Career Decision-Making Program* which will be available through a commercial publisher in 1976. This program consists of a series of fifteen Career Guidance units which provide core materials for lesson plans in career exploration and decision-making. These units can be flexibly used in a one-semester course, or infused in the regular curriculum, and it is expected that this program will have nation-wide impact when it becomes available.

Despite the interest expressed and the availability of the materials mentioned above, we have found no evidence of widespread use in any systematic way. They are either ignored or have been found wanting in the most prevalent modes of delivering guidance services, leading one researcher to observe that although teaching decision-making skills is assigned a high priority, "there at present exists little curriculum in this area." (24)

---

*See Appendix, pp. V-15 to V-17 for report of visit to Appalachia Educational Laboratory, July 17, 1975.

This may be an overly gloomy view; it is possible that more is being done in this area than has been identified and documented, particularly in those settings where guidance is being infused in the curriculum. In Oregon, for example, a growing number of career decision-making classes are being offered, taught primarily by counselors, when the need appears to be too great to be fully met through individual counseling. This development in Oregon is undoubtedly fostered by a strong Career Education emphasis as well as by the availability of the computer-based Career Information System. (25)

Testing

Large scale use of group testing appears, according to our questionnaire to state school chiefs, to be a general practice in most secondary schools, even though nearly half of the respondents to this questionnaire reported that there were no statewide requirements for testing in their states. The largest volume of testing appears to be related to the administration of achievement tests (California, Iowa, Stanford, SRA, CTBS, ITBS, ITED, or special state modifications) which serve institutional purposes and also assist in planning a student's program.

Another significant area involves ability tests (ACT, CEEB, SAT, PSAT, etc.) which have direct relationship to college admission, and for which a fee is charged. Considerable controversy has arisen over cultural bias in such tests, but they continue to be used because they are helpful in predicting academic success in college.

There is also widespread use of aptitude tests more directly related to career choice. The most frequently mentioned is the GATB, followed by the ASVAB and the DAT. During the past several years questions have been raised about the validity of such aptitude measurements. As a consequence, they may not be used as extensively as in past years, and counselors are cautioned against over-reliance on their results.

Interest inventories, as an aid in career planning, are used in a significant number of school systems. The most popular are the OVIS and Kuder, with lesser use of the Strong (SVIB) and the VPI reported.

One of the most significant shifts in testing policy appears to relate to the standard intelligence tests (I.Q.). In his 1968 survey of guidance practices, Campbell (26) found widespread use of such tests, with counselors and teachers considering them along with achievement and aptitude tests as the three most useful in their work with students. In our survey of state school chiefs, only one reported general use of intelligence testing. This is undoubtedly an outcome of the mounting criticism of such instruments by citizen groups. Similarly, personality tests (such as the Minnesota Multi-phasic) which had some users in the past, are seldom mentioned in reports of current practice.

One authority has summed up his observations on testing practices in this way: (27)

> *"We have found that for a variety of reasons, including lack of time, lack of client interest, lack of counselor training, preoccupation with evaluations for institutional purposes, many guidance specialists, particularly within the school setting, do not conduct personal assessment in a manner conducive to helping individuals develop improved career plans. They frequently overemphasize testing and frequently misinterpret test results, thereby misleading clients as to their options...Faced with the need to assess large numbers, counselors have understandably looked for short cuts. Testing appears to be a way out. But...personal assessment is a much more complex undertaking, including a joint probing and evaluation of the individual's strengths and weaknesses."*

Facing questioning of this kind, as well as the criticism by civil rights groups (in one state a "Family Educational Rights and Privacy Act" has apparently brought a halt to the administration of most tests) guidance practitioners are no longer as confident about the place of testing and the use of test results as they once were. However, it can be expected that much will continue, particularly achievement testing, given the growing concern with accountability and competency-based education.

Utilization of Community Resources

To supplement the career information available to students within the school, almost all secondary schools have programs for bringing in guest speakers from industry, government, and the professions. A common trend is toward a series of career conferences scheduled throughout the year, replacing the traditional once-a-year "Career Day." (28) Field trips to observe industrial processes and occupations are less common, because of the difficulty and expense involved in arrangements, timing, and transportation. Students tend to rate both types of experience as quite valuable. (29)

Actual work experience, either paid or voluntary, can be a significant avenue of career exploration, and is generally considered to be singularly valuable by students who have had the opportunity to participate in such programs. There are three main types: general work experience, which is paid, supervised part-time employment; vocational work experience, which is part-time employment related to an occupational course in which the student is enrolled; and exploratory work experience, which is unpaid short-time placement for school credit. (30) However, schools do not have the time or resources to make some type of work experience available to most of the students who could benefit from such a program.

There are two additional problems. Only a small percentage of those enrolled in such programs work in an area related to their career interests. Secondly, these programs are primarily geared to the potential drop-out or to the student who is seeking a vocation immediately after high school graduation. There is a paucity of programs which provide work experience or internships in science-related careers.

Conclusion

In this chapter we have discussed most of the more frequently raised criticisms of present-day guidance practice in secondary schools. We have found that Career Guidance is predominantly counselor-based and is incidental to the total pupil-personnel program. We have concluded that because of the problems of staffing and workloads, the lack of commitment to the importance of Career Guidance, and the growing acceptance of the sequential nature of career development underscored by modern theory and research, the one-to-one counseling process cannot be relied upon as the major vehicle for the effective delivery of Career Guidance services.

We have reported on some of the significant activities that have emerged to supplement the counselors' efforts. Career Guidance Centers, by whatever name, have grown rapidly in the past four years. They provide a much-needed service in organizing, maintaining, and making accessible to students a broad range of informational materials on occupations and educational resources. In a number of cases they also coordinate school relationships with community resources:arrangements for career days, guest speakers, field trips, and cooperative work-experience projects.

We have briefly discussed some of the approaches to teaching decision-making skills. Despite the availability of a number of curriculum materials in this area, there is no evidence of wide-spread use; apparently there are practical problems of integrating these techniques with the process of career development.

Testing practices no longer have the enthusiastic and unquestioned support they once enjoyed. Questions about the validity of some tests, concerns over cultural bias in others, as well as criticisms directed to over-reliance on and misuse of test results in the past, appear to have diminished the importance of testing as a tool in Career Guidance. Both philosophical and empirical questions need to be resolved before greater clarity can emerge about the appropriate place of testing in the guidance setting.

We have discussed some of the ways in which the use of community resources is coordinated with the school's Career Guidance program. The implementation of internships or some form of exploratory work experience for science students is an area whose potential needs further exploration and development.

Most of the literature on guidance practice is devoted to describing innovative or exemplary practices. There is little information available which gives a quantitative and qualitative picture of the prevalence and nature of practices across the nation. Something is happening in connection with Career Guidance in nearly every high school, but from the literature extant it is not possible to determine just what is happening or to what extent changes are occurring. Much more information, providing assessment of these efforts and their efficacy, is basic to determining the current status of Career Guidance and the potential of emerging practices for the guidance of science students.

REFERENCES--CHAPTER V

1. Hansen, L. Career Guidance Practices in School and Community, National Vocational Guidance Association, Washington, D.C., 1970, p. 127.

2. Sprinthall, N. "Humanism: A New Bag of Virtues for Guidance", The Personnel and Guidance Journal, Vol. 50, No. 5, January 1972, p. 349.

3. Hansen, L. and Borow, H., "Toward Effective Practice: Emerging Models and Programs", in Borow, H., ed., Career Guidance for A New Age, Houghton Mifflin Co., Boston, 1973, p. 181.

4. Thal-Larsen, M., Placement and Counseling in a Changing Labor Market, Institute of Industrial Relations, University of California, Berkeley, 1970, p. 225.

5. Campbell, R., Vocational Guidance in Secondary Education, Results of A National Survey, The Center for Vocational Education, Ohio State University, Columbus, Ohio, 1968, p. 44.

6. Kirk, B., Factors Affecting Young Women's Direction Toward Science-Technology-Mathematics, Management Technology: Career Projects, Berkeley, California, 1975, p. 195.

7. Ginzberg, E., Career Guidance: Who Needs It, Who Provides It, Who Can Improve It, McGraw Hill Book Company, New York, 1971, p. 271.

8. Boy, A. and Pine, G., Client-Centered Counseling in the Secondary School, Houghton Mifflin Co., Boston, 1963, pp. 225-231.

9. Wrenn, C.G., The Counselor in a Changing World, American Personnel and Guidance Association, Washington, D.C., 1962, p. 137.

10. Campbell, R., op. cit., pp. 82-84.

11. Ibid., p. 59.

12. Thal-Larsen, M. op. cit., p. 221.

13. Kirk, B., op. cit., p. 195.

14. California School Counselor Association, Counselor Questionnaire - Results, (unpublished mimeograph), Fullerton, California, May 1969, p. 4.

15. Subcommittee on Career Guidance of the Committee on Specialized Personnel, Career Guidance, Manpower Administration, U.S. Department of Labor, Washington, D.C., 1967, pp. 12-16.

16. Ginzberg, E., op cit., pp. 251-252.

17. Holland, J., "Career Counseling: Then, Now, and What's Next?" *The Counseling Psychologist*, Vol. 4., No. 3, 1974, pp. 24-26.

18. Willingham, W., Ferrin, R., and Begle, E., *Career Guidance in Secondary Education*, College Entrance Examination Board, New York, 1972, pp. 8-9.

19. Jacobson, T., *A Study of Career Centers in the State of California*, Grossmont Union High School District, La Mesa, California, 1975.

20. Ibid, pp. 40-45.

21. Willingham, W. et al, op. cit., p. 35.

22. Campbell, R., Waltz, G., Miller, J., and Kriger, S., *Career Guidance: A Handbook of Methods*, Charles E. Merrill, Columbus, Ohio, 1973, p. 143.

23. Hansen, L., op. cit., pp. 94-97.

24. Jacobson, T., op.cit, p. 88.

25. McKinlay, B., *Developing a Career Information System*, Final Report, Contract No. 82-41-7203, Manpower Administration, U.S. Department of Labor, October 1974, p. 136.

26. Campbell, R., op. cit., p. 55.

27. Ginzberg, E., op. cit., pp. 184-185.

28. Hansen, L., op. cit., pp. 57-58.

29. Jacobson, T., op. cit., pp. 56-60.

30. Ibid, pp. 65-67.

CHAPTER VI: CAREER EDUCATION AND CAREER GUIDANCE

Introduction

More than once we have heard the recent history of secondary education in the United States described in statements that run about as follows:

> *"The fifties were the decade of Sputnik; the sixties were the 'age of excellence', the seventies belong to Career Education."*

Whatever the merits of this characterization there are those who reject the third proposition. In terms that are reminiscent of the long-standing conflict between the proponents of a liberal education and those subscribing to a more narrowly conceived professional or vocational education, they argue that the tenets of Career Education can lead only to our producing a generation of technocrats. This argument, we believe, lies outside the scope of the present report. However, before dismissing the subject it must be pointed out in all fairness that the adherents of Career Education, while they do emphasize the goal of education as preparation for work, also apply this emphasis in a way that neither demeans nor detracts from other worthy goals of education. Although it obviously encompasses economic man, the Career Education concept goes beyond, to the broader aspects of productivity in one's total life style--including leisure time.

A second complaint regarding this consignment of the present decade to Career Education is voiced out of a concern that it may be but a passing fad. It can scarcely be expected that the present level of enthusiasm for this approach to education will be sustained indefinitely. Nonetheless, if its supporters are correct in seeing it as a "reform movement", answering a widespread and general protest against previous practices, Career Education is here--if not to stay--at least to remain for a long enough period that its agenda must be heeded by those wishing to improve Career Guidance. Most especially, its potential for affecting guidance practices as they relate to the career attention given a specific group must be assessed by any organization concerned with the guidance provided to that particular population. The probable durability of Career Education concepts plus the strong likelihood that their applications represent a long step forward from previous practices, are the justification for the present chapter.

In it we shall describe the emerging relationship of Career Education and Career Guidance and the thinking of participants in this mode of education as to its potential for assisting in the guidance of science majors at the secondary school level. Also, we shall urge Career Education as a priority area for investigation and action by the National Science Foundation.

Career Guidance as a "Subset of Career Education"

In an earlier chapter we proposed a working definition of Career Guidance that was practically devoid of "doctrinal" implications; that is, our definition was not attached to any particular theory of career development. We defined it as simply "efforts to provide assistance to people in relating their special characteristics to their career choices and progress." Further, we gave no comprehensive definition of Career Education but merely listed various of the elements falling within its domain. Now, for the purpose of further exploring the relationship between the two, we must put more flesh on both of these constructs.

We have mentioned previously that Career Education concepts can be considered an infusion into guidance and into education. Possibly, at this point, a more precise way to characterize the relationship between Career Guidance and Career Education is to consider the former a part of the latter if the guidance provided is based in large part upon developmental theory (many of whose assumptions have been presented as Career Education concepts). It must be noted, however, that Career Education is designated as the whole rather than the part because it includes the actual imparting of the skills and knowledges required for career performance. And because it includes all careers, this imparting of skills and knowledges is broader in scope than is that of vocational education. Further, only that part of the counselors' activities that may be considered functions of Career Guidance would fall within the sphere of Career Education proper.

In our perception, probably the best description of the relationship of the two has been provided by JoAnn Harris Bowlesley who has designed Career Guidance systems that are at once firmly grounded in developmental theory and admirably adapted to function as delivery media in a strong Career Education effort. She has described this relationship in a recent speech as follows:

> *"Let me begin by proposing a definition of career guidance which is simplistic, although it seems to incorporate the thinking in this area from Frank Parsons to Kenneth Hoyt.*
>
> *"Career guidance is a systematic program of experiences designed to assist an individual to a) understand his/her personal interests, abilities, values, and needs; b) to understand the broad range of options available in the world of work and education; and c) to make career decisions which inter-relate self-information with career information for the maximum satisfaction of the individual.*
>
> *"I view career guidance as a subset of career education which has more limited objectives and functions than those of the total career education movement."* (1)

Next it is of interest to catalogue what this speaker includes as the functions (or components) that make up that part of the totality of Career Education which can "be fenced by the rubric of career guidance." These seven components, in outline, are:

1. *"The development and clarification of self concept"--those activities, programs and experiences designed to assist each individual to have a realisitic picture of his interests, strengths, competencies, needs and values.*

2. *A set of experiences or treatments designed to assist the individual to translate the self concept into occupational terms (e.g., a translation from "I am good at math." to "I could possibly do jobs in science, accounting or computer programming.")*

3. *A set of "engineered experiences: to assist individuals to explore the universe of occupational alternatives in an organized way.*

4. *The deliberate teaching of decision-making. This skill is a factor of vocational maturity and can be taught.*

5. *The provision of reality testing of top-priority occupational choices. (Here, according to the speaker, "We badly need innovative ways to provide reality testing across the total spectrum of occupational levels and fields.")*

6. *A set of planned experiences to assist with choice which is based upon self-knowledge, exploration of alternatives, use of deciding strategies and reality testing.*

7. *Assistance with the implementation of choice providing whatever is necessary for the implementation be it job placement, finding on-the-job training, or selecting a college.*

All of the above components can be found expressed, implicitly or explicitly, in officially adopted policy statements describing the content of Career Education. (2)

As examples, among the "basic concept assumptions of Career Education" are listed:

> *"Both one's career and one's education are best viewed in a developmental rather than in a fragmented sense."*
>
> *"Protection of the individual's freedom to choose--and assistance in making and implementing career decisions--are of central concern to career education."*
>
> *"The expertise required for implementing career education exists in many parts of society and is not limited to those employed in formal education."* (3)

Among the "Programmatic Assumptions of Career Education" are such examples as the following:

> *"Career decisionmaking skills, jobhunting skills, and job-getting skills can be taught to and learned by almost everyone. Individuals can effectively use such skills, once learned, to enhance their career development."*

> *"Relationships between education and work can be made more meaningful through infusion into subject matter than if taught as a separate body of knowledge."* (4)

Concept and programmatic assumptions such as the above (plus many, many more that are addressed to areas lying outside that "fenced off" as constituting Career Guidance) carry implications for the organization and work load of school personnel.

The official pronouncement is that:

> *"To the greatest extent possible, initiation of comprehensive career education programs should be undertaken utilizing existing personnel and existing physical facilities. The assumption of new roles by some staff members can be accomplished in most educational systems with no serious loss in total institutional productivity."* (5)

This statement, made operational in terms of the assumptions of Career Education, means that teachers will take on duties, new to some, including:

> *"Devise and/or locate methods and materials designed to help pupils understand and appreciate the career implications of the subject matter being taught"*

> *"Utilize career-oriented methods and materials in the instructional program, where appropriate, as one means of educational motivation"*

> *"Helping students acquire job-seeking and job-getting skills"*

> *"Participating in the job-placement process"*

> *"Helping students acquire decisionmaking skills."*

Meanwhile counseling and guidance personnel, among other duties, will:

> *"Help classroom teachers implement career education in the classroom"*

> *"Serve, usually with other educational personnel, as liaison between the school and the business-industry-labor community"*

> *"Help students in the total career development process, including the making and implementation of career decisions"*

"Participate in part-time and full-time job placement programs and in follow up studies of former students"

From the above it can readily be seen that the counselor takes his place as a team member, working with teachers and other school personnel, in an overall Career Education effort that is to receive in addition strong support from home and family as well as the business-labor-industry community.

This community, it is stated, is to provide "observational, work experience and work study opportunities for students and for those who educate students (teachers, counselors, and school administrators.") It is also to serve as "resource personnel for teachers, counselors and students", and to "participate in part-time and full-time job placement programs", among its other involvements in the Career Education effort. (6)

In sum, if one is to view Career Guidance in Career Education terms, he must look beyond the counselor, his traditional practices, and his position of heading the guidance function. Instead, there is to be a team effort in which teachers, counselors and various school personnel act in concert with the community to provide Career Guidance. And so far as that part of Career Education comprising Career Guidance is concerned, the newer practices that should be appraised as to their efficacy include, although they are not limited to, using career oriented methods and materials in the instructional program and providing observational, work experience and work-study opportunities for students and for those who educate students.

These are the practices that should be examined specifically to determine their potential for science majors. This recommended examination is not meant to imply that exploring the more conventional elements of guidance as to their potential for benefiting the science major is of any less significance. It is merely to state that an important dimension of guidance is ignored if these newer practices are not thoroughly evaluated for their impact on science majors along with the general tenor of Career Education as it influences their opportunities to be provided effective Career Guidance.

Career Education for Gifted and Talented Students

Our efforts to find authoritative statements in the literature concerning the application of Career Education concepts to science majors proved fruitless. This was true whether the majors involved might lead to upper-level careers in pure science or to careers at the technologist level. As there was no better alternative, we turned to a flattering, yet, we believe, acceptable surrogate for science majors--"gifted and talented students." We fully appreciate that not all gifted and talented students are science majors and that not all science majors are gifted and talented students, particularly as the latter are now defined. The "gifted" appears to us to constitute a less specialized group than those who had elected to major in science or those possessing strong capabilities to enter careers in science, mathematics or technology. Therefore, we had hopes that information about applications of Career Education to the guidance of this group might be more readily available than we had found it to be for science students.

That our accommodation to necessity would net us little specific information was soon evident. As Kenneth B. Hoyt who heads the National Career Education effort has written:

> *"Efforts to locate career education programs for the gifted and talented have for the most part been unrewarding...Evidently very little has actually been accomplished which could be described as a permeating career education focus for the gifted and talented which would accompany general education from kindergarten through the twelfth grade."* (7)

Although systematic programs of Career Education specifically designed to improve the guidance of gifted and talented students are difficult to locate, career educators have nonetheless given considerable thought to the problems faced by these students. Also, they recognize the difficulties confronting the educational establishment if the gifted are to receive, and the schools are to provide, adequate opportunities for their optimal career development. By and large a hospitable attitude towards special treatment for these students appears to exist among career educators. In part this is due to a trend towards greater individualization and flexibility in educational programming which has been evident since the beginning of the seventies. Options other than the usual formal education to assist gifted as well as all other students to meet their objectives have increased. For the gifted, this has generally meant that selected students may be encouraged to take courses at a nearby college, that waivers for the twelfth year may be granted, and that innovative arrangements with the outside community may be developed in order to enrich what the school has to offer.

Although the concept of giftedness has greatly broadened in recent years (and it is of the essence of Career Education to recognize that this quality may exist in every occupational stratum)

> *"the most widespread concept of giftedness in our culture continues to be expressed in terms of those abilities and expressions of high level performance that contribute to success in academic pursuits."* (8)

Inasmuch as it is a tenet of Career Education that the student leaving school must have been prepared either to enter employment or to continue his education, the academically oriented are by no means disbarred from receiving special career attention.

It is recognized that these students may well require special attention because they may have special problems. Possessing as they do many potentialities and varied interests complicates their selection of a career, as do the high expectations which other have of them. Further, most of the academically gifted are attracted to occupations that require heavy investments of time and money. As a result, too late a choice or the wrong choice is more than ordinarily costly for them. For these reasons career educators are likely to urge (in contrast to some counselors) that the gifted and talented be especially encouraged to make occupational decisions. It is stressed that they be assisted in doing so by various forms of career exploration, by summer and part-time employment, and by participatory opportunities with persons in careers directly related to their fields of interest. To provide such opportunities will require much innovation and close ties with the outside community as well.

Judging by the paucity of examples of such innovation that has progressed beyond the initial stages of identifying the students to be involved, much work remains to be done in this area. In particular, it would be challenging to explore whether or not these Career Education approaches substantially improve the Career Guidance provided to science students. (9)

Also indicated as one promising area of future study so far as the Career Guidance of science students is concerned, is the Career Education emphasis upon incorporating career content into the curriculum. It is easier to maintain that this should be done than to develop and provide the perceptual training, open-ended problem solving, knowledge of the relationship between academic content and various occupations, and study of the lives of creative people that, perhaps, should be embedded in the curriculum offered to science students.

A "Small Survey" of Career Education Directors*

Before giving up the search for Career Education projects that were oriented to the concerns of this study, we asked Dr. David Jesser, Director of Career Education for the Council of Chief State School Officers for his assistance. It was our hope that we could locate applications of Career Education concepts that were specifically directed to gifted students, including science students, or that required the cooperation of employers who hired significant numbers of workers in science and science-related occupations.

Dr. Jesser suggested that we contact those directing the Career Education efforts of six states he selected because of their active programs and the likelihood that they might have embarked upon such projects. He also suggested that it would be worthwhile to query these respondents about more general matters as well.

Although we found that a few projects had been initiated in these states, none of the type we were seeking had been in progress for a sufficient length of time that empirical data concerning them were available. This we determined by contacting the project directors to whom we were referred by the State Career Education chief officers. However, we did obtain the opinions of these six on various matters of significance to the present study.

It was their consensus that Career Guidance is a part of, or is supportive to, Career Education. The counselor's role was variously expressed as one of assuming "some leadership responsibility" in the general effort; of acting as "catalysts, resource and liaison persons"; as being "primarily a member of the Career Education team" and, along with the teacher, as being part of the "delivery system" for conveying the body of knowledge that comprises Career Education.

---

*See Appendix pp. VI-1 to VI-11 for a full report of the responses to this survey.

Consensus also existed as to the need of the gifted student, particularly the student with strong capabilities for pursuing a career in science, mathematics or technology, for special career attention while in high school. The recognition of this need was based upon the premise that forms of guidance should be devised that will meet the unique requirements of every student.

There was general agreement that a vigorous Career Education effort would benefit the gifted, as it would all others. The respondents believed that the basic tools of Career Education are as applicable to, and are needed as much by, science majors as by any other students.

Many suggestions were put forward for applying these tools specifically to science students. They included among others, incorporating career awareness into science and mathematics courses and also relating science-mathematics concepts to applications in the world of work. The need "to bring the outside in" was expressed in such suggestions as including the industrial community in the classroom; exposing teachers and counselors to scientific occupations; and, supplying the student with "reinforcing, exploratory, learning experiences that provide the sight, sound, taste, smell and feel of science-based careers." Strongly mentioned were the basic changes that must occur if guidance is to be improved in general, and therefore for science students. These included changes in the training of both counselors and teachers and also in the interrelationships of various types of school personnel, as well as in the division of functions among them.

Having implications of a different sort were the comments made by two of the respondents. One of them emphasized the need to provide an adequate picture of the aptitudes and interests relevant for science careers through learning experiences started in early childhood and sequentially developed until the student reaches his decision point. Only in this way can the student arrive at a self-appraisal of his or her interests, aptitudes and values. This comment raises a question as to how many students may be denied this type of experience because their schools do not offer science courses in the early grades.

One study of a group of high ability young women with strong capabilities for entering careers in science, mathematics and technology has shown among its findings that curriculum as a factor in influencing career direction is of greater importance than has been generally assumed. Writes the author:

> *"A common pattern for science is that there is no regular formal teaching until the seventh or eighth grade. Consequently there is little if any familiarization with concepts or facts, particularly during the periods of most active mental growth...Early and consistent exposure to*

> *all sciences appears to be a practice which might well be investigated and experimented with."* (10)

Another Career Education officer, responding with, possibly, some misconception of our intent in posing certain questions in terms of gifted students, wrote:

> *"...in our technological society there is a serious need to help literally millions of students, who although they may not be classified as 'the gifted' will find their self-fulfillment and make a contribution to our society by a life's work in the world of science, mathematics and technology."*

This comment, like several others (11) made in the course of our interviews serves to point up the necessity in our type of society of improving the guidance given to a far wider population of students than those who are ultimately destined for what one interviewee called the "top scientist positions" or even to "future science majors." If a modern technological economy is to be provided with the labor force required to ensure its proper functioning and continued progress, it is hardly less dependent upon its technicians, technologists, craftsmen and operatives than upon its scientists. From this inter-dependency it follows that providing students who may later work at any of these occupational levels with guidance leading to their career satisfaction is closely allied to the continuing advance of science and technology.

Conclusion

In this chapter we have explored the relationship of Career Guidance to Career Education. In the main, the former is perceived as a part of, or as supportive to, the latter. The domain of Career Education, however, is not limited to guidance. Its scope also includes the skills and knowledges permitting students either to enter employment or to continue their education upon leaving a given level of schooling.

The prognosis for Career Education is such that it appears unwise to launch efforts at improving guidance without taking into account the larger framework of Career Education concepts and procedures which are now beginning to affect guidance organization and practices. (12)

REFERENCES--CHAPTER VI

1. Systematic Career Guidance, a Subset of Career Education, a speech presented at the Career Education National Forum, Center for Vocational and Technical Education, Ohio State University, Columbus, Ohio, by JoAnn Harris Bowlesley.

2. See Hoyt, Kenneth B., An Introduction to Career Education--A Policy Paper of the U.S. Office of Education, DHEW Publication No. (OE) 75-00504. In the Foreward, Terrell H. Bell, U.S. Commissioner of Education states, "This booklet...describes the Office of Education's interpretation of HEW policy on career education. It's content is also consistent with the provisions of Section 406 of the Education Amendments of 1974 which provides the first official congressional endorsement of career education."

3. Ibid., pp. 4-5.

4. Ibid., p. 7.

5. Ibid., p. 8.

6. Ibid., pp. 8-9.

7. Hoyt, K.B. and Hebeler, J.R., Career Education for Gifted and Talented Students, Olympus Publishing Company, Salt Lake City, Utah, 1974, pp. 209-210.

8. Ibid., p. 81.

9. Ibid., pp. 218-219. This reference provides but three "sporadic efforts at providing exploratory experiences in science (which) were located through an ERIC search." These experiences, provided to assist science students in their career decision-making, include a 1960 Harvard study evaluating a summer program for science students, a Miami University study of a summer program, and a research participation program at American University funded in part by the NSF. All programs appear to have been successful in reaching their objectives.

10. Kirk, B.A., Factors Affecting Young Women's Direction Toward Science-Technology-Mathematics, Management Technology: Career Projects, Berkeley, California, 1975, pp. 129-130.

11. One high level Department of Labor official, in particular, insisted that we "Keep talking about mid-level jobs." He said that we should "go to pains to point out to the National Science Foundation that the years of NDEA have, in many cases given us a surplus of scientists while, at the same time we have shortages of technicians and technologists. With better work on occupational clusters we could show the student who is interested in a field such as health, space or ecology how many, many

different jobs exist at various levels in that field." He continued that we should "always argue on the assumption that we won't get very far at cleaning up the guidance area just for science students because it's one society, one labor market, and one generation of students who are facing unemployment as never before. We must strengthen all of the systems that support Career Guidance including the delivery system if we are to be of any help."

12. Hoyt, K.B., "Career Education: Challenges for Counselors", The Vocational Guidance Quarterly, Vol. 23, No. 4, June 1975, pp. 303-310.

CHAPTER VII: COMPUTERIZED CAREER GUIDANCE SYSTEMS

Introduction

In Chapter IV we mentioned that, for the most part, the school officials whom we questionnaired looked to two developments for the future improvement of Career Guidance.

One is Career Education. They saw its concepts as giving a new thrust to education and to guidance. Its practices, they indicated, would provide a needed infrastructure and create a setting which would spur each to attempt needed innovations.

The second development is the computerized guidance system. Their support for the computer appeared to rest primarily upon its capability for storing and retrieving great masses of data; in other words, serving as an extension of the human counselor in his information-delivering capacity.

Various issues are debated in connection with the use of computerized guidance systems no less than with the adoption of Career Education concepts and practices.

Possibly, the first charge to be raised, and one that continues to be voiced, is the objection that computers are "inhuman," that they will "depersonalize" guidance. One of the critics has written to this point as follows:

> *"Computers may help persons plan their careers by providing speedy information and even by carrying on a logical dialogue. But how can programmed machines ever help concerned youth answer questions dealing with complex, individual, existential problems? Often, computers are not developed to take into account idiosyncratic needs. It is quite possible that as young people begin to place more emphasis on challenging the values of a technological society, they will be less and less inclined to seek assistance from machines."* (1)

Evaluations and anecdotal reports of systems now in operation, however, do not appear to bear out this writer's concerns nor to support other, related, complaints. A leading authority in the guidance field in describing the gap between the fears that are expressed prior to installation of a system and the reactions following its use, writes:

> *"Fears of the displacement of counselors by machines, of depersonalization by mechanization, of middle-class bias, of violations of privacy, are rarely expressed when the systems are viewed in the concrete, but appear rather to be the product of theory or of abstractions - one might say, of stereotyping."* (2)

More difficult to overcome in the installation of systems may be the counselors' anxieties that they will be displaced. Counter-arguments to this fear have been that the volume of information is plainly now too vast for it to be manageable by humans, and also that the counselor, if freed from the bondage of information-handling, can devote himself to his true function--counseling. One writer has commented on this matter as follows:

> *"In relying primarily on the counselor to gather, sort, validate, and transmit the tons of occupational information covering thousands of occupations, we are being unrealistic. We are asking the counselor to accomplish an impossible task, one that is ill suited to his nature and capabilities."* (3)

As to counselors' attitudes towards mechanization and fears concerning the substitution of machines for themselves, a consensus appears to be emerging that if the proper safeguards are taken,

> *"The systems will then be welcomed as true aids to effective work, freeing counselors from clerical and other routines, for creative endeavors which are central to their roles."* (4)

Costs,also, are a subject of contention in the matter of installing computerized guidance systems. We have heard authorities maintain that it would require the services of an outstanding cost accountant and a recognized computer expert to answer authoritatively, after considerable study, just one of the questions that arise about comparative costs. Which is cheaper--the Career Guidance system that "comes free" because it shares the same equipment utilized for many other purposes, or the dedicated computer?

A more general question revolves about the ability of school districts any longer to afford the costs of one-to-one counseling. And if they cannot is the computer the answer? Surely the best reply must come from the school districts themselves. As one guidance expert has put it:

> *"The root problem seems to be one of selecting for the guidance program a set of appropriate goals which are attainable within the current and projected resources of the school."* (5)

Other issues as to computerization strike us as even more fundamental than those mentioned above. Yet in our view, they are seldom emphasized to the extent that is warranted.

First, there is the question, "How much of the counselor's role should be preempted by the machine?" Or possibly this question is better phrased, "To what extent should the counselor be supplemented by the computer?" It is comparatively easy to obtain agreement that the computer provides invaluable assistance to the counselor when the problem to be resolved is the storage and retrieval of occupational and educational data. But should what is essentially programmed instruction imparting decision-making skills or "teaching values" become a mechanized component of Career Guidance? Decisions as to offering instruction of this type via the computer, similarly to decisions on the method employed to structure user access to stored information, are related to the system's basic theory. The unease of some systems directors as they are confronted with these decisions and choices can only be dispelled after more consideration is given to the comparative efficacy of various systems as measured by outcomes.

Secondly, to our way of thinking less attention than required is paid to resolving speedily the multitude of data base problems which, although long with us, will be exacerbated by the rapid spread of computerized systems that now appears imminent. Clearly, a technology permitting us to increase the numbers who will receive career information by several orders of magnitude has not been matched by our capabilities to improve the information that will be dispensed. Various problems persist--problems of resource allocation; data collection, coding and classification, information formating; and user skills in information handling. These same problems have inhibited the acquisition of a sound data base for Career Guidance to this day, and they will remain intractable until they receive as much or more consideration than is given to the delivery systems themselves.

A third area that also appears slighted is the relationship between computerized career information delivery and the setting within which it occurs. The mere presence of such a delivery system is not tantamount to the existence of an infrastructure of sound counseling practice. The relationship of the system to the total guidance program--to counselors, teachers, students, parents and the outside community--is surely a more important determinant of the goodness of the system's outcomes than are the hardware and telecommunications it utilizes. One guidance authority, concerned about the relationship between information delivery and its setting argues for what others have termed the "integrative approach to computerized counseling." This approach would take into account the blending of hardware, people and setting which results in various procedures and equipment constituting an organic whole. This authority writes:

> *"To a large extent, the social setting into which a technology is introduced will influence whether, to what extent, in what ways, and which ones of the benefits potential in a technology will be realized. This suggests that it is undesirable, even dangerous, both to discuss the utility of a given technology without reference to the setting in which it is to be used, or to generalize about the usefulness of a technology from one setting to another. We would be well advised to consider computer-assisted counseling as a component of a highly variable social setting (guidance program within a school community). As such a component, it is to a degree ungeneralizable because it is both shaping and shaped by the interaction of guidance, school, and community."* (6)

Such issues as mentioned above can be resolved only as more experience is gained in the use of computerized Career Guidance systems. This longer experience together with more rigorous evaluations of their operations and outcomes than have yet occurred, and also comparative studies of the functioning of different systems, are all required before many crucial questions can be answered authoritatively. Hence, the remainder of this chapter will not provide definitive answers.

Instead, it will be devoted to the writers' observations regarding seven computerized Career Guidance systems. For the reasons cited above these observations, based upon a series of site visits occurring over the past year, must be descriptive rather than evaluative. As such, they will indicate, not resolve, the major problems confronting systems designers and users.*

---

*See Appendix, pp. VII-1 to VII-5 for tables showing a typology of the systems described in this chapter.

1. THE OIAS - OREGON'S OCCUPATIONAL INFORMATION ACCESS SYSTEM

Introduction

Our descriptions of the major computerized Career Guidance systems begin with an account of the Occupational Information Access System (OIAS) for several reasons.

With the inception of the National Occupational Information Service (NOIS), which is sparking the development of computerized guidance systems in eight states through a program of federal grants, Oregon's system has taken on a new significance. The OIAS will serve in many respects as a prototype for these systems, now in an initial stage of development. In their applications for funding which were judged competitively, the states were required to commit themselves to following certain specifications derived from the Oregon model.

This requirement of the Department of Labor's NOIS will by no means straitjacket systems development in the eight grantee states. In fact, the states that were successful with their proposals are now negotiating with the developers of various systems, to be described later, respecting the adoption of these systems in whole or in part. However, certain features characterizing OIAS are to be incorporated in the NOIS supported systems that will lead to their widespread application and provide valuable opportunities for their evaluation.

Among the features characterizing OIAS that are to be emulated by the grantee states is its organization under a consortium representing state agencies and others, and responsive to the needs both of information users and producers. Also to be observed is the practice of providing the user at least the alternative of open access to the stored information; a strong base of current localized Occupational Information; and, after three years, the system's capability to be supported by user agency fees.

Our description of OIAS will, therefore, be somewhat longer than those that follow. Its features that are to be emphasized in the eight new systems with appropriate variations, deserve discussion because of their potential prominence. Also, more detailed treatment in this first section will permit greater brevity in subsequent descriptions whenever other systems may be adequately portrayed simply by noting their commonalities or their differences in relation to this model.

Background and Organization

OIAS is the computer-based career information retrieval unit that functions within a larger system, Oregon's Career Information System (CIS). In this system, a statewide interagency consortium provides current labor market and educational information to individuals, schools, and social agencies for the purpose of improving career choice and training opportunities. The primary functions of the CIS are to: (1) collect current labor market and educational information and to develop it in usable forms; (2) develop and manage delivery systems; and (3) consult with member agencies on the use of career information in instructional programs.

Although the CIS has until recently been unique among the states, the problems it was designed to meet in Oregon and the resources brought into play to effect their solution were far from unique to that state. It was in Oregon, however, that the confluence of various concerns and developments eventuated in concrete results.

As early as 1960, there was discussion in this state as in others of an Occupational Information system that could effectively serve students and the clients of social agencies in a variety of settings. This discussion evolved into the recognition that achieving this goal would require a coordinated management of data between the various state agencies directly concerned with the production and dissemination of Occupational Information. Discussions finally led to the establishment in 1969 of a group with a common commitment--to find practical information delivery devices backed up by a viable organization that could provide for information development, in-service training, and overall administration and funding. The group undertaking this commitment included representatives from the Oregon employment security agency's Employment Division, Department of Education, and State University, as well as from the University of Oregon and the Lane County Intermediate Education District.

Almost fortuitously, the agencies involved in this joint venture had a legacy of past achievements and of common concerns that proved helpful in their search for a Career Guidance system. The Oregon Employment Division had a record of producing area skill surveys that exhibited substantial advances in both research methodology and delivery format. Its 1967 Lane County Labor Skill Survey contained a variety of localized data including information about both labor supply and demand in connection with 200 occupational briefs written in non-technical style.

The survey was well received by counselors and program planners in the schools and social agencies following its release. However, it was readily apparent that the use of Occupational Information in this format for career planning was seriously impeded by the absence of any mechanism to help the average user identify the occupations he should examine. Even this early, the problem of user access came to the fore. Without an instrument permitting the individual to express information about interests, abilities, preferences and needs, users would continue to be influenced by status considerations, race, family background, and other limiting associations.

Another important resource at the group's disposal was a project of the U.S. Employment Service, the Oregon Employment Division, and the University of Oregon involving work on an innovative information system - the OIAS. This project was funded by the U.S. Department of Labor in 1969 to design and field test a model information delivery system.

During these same years, a receptive environment had been growing in Oregon's educational institutions for the implementation of a Career Guidance system. The state's Department of Education and several local school districts within the state were developing strong Career Education programs. The State Department of Education took a leading role in the formulation of career clusters based on labor market demand which now serve as the basis for much of the Career Education in secondary schools and which have influenced classification of the occupational data used in OIAS. However, increased experience with Career Education quickly demonstrated that this approach to education involves decision-making skills as well as Career Guidance and career information.

Oregon also boasted a community college system with its own problems. These included attempts to place major emphasis on occupational preparation, and efforts to move towards joint planning and the allocation among different schools of specialty programs.

Even with this mixture of needs--and of resources consisting of components of practical delivery systems--the requirement remained for an organizational effort to implement an overall system and for staff to insure that accurate and timely information was available and disseminated. But no agency represented in the group, acting singly, possessed the expertise or the financial resources to achieve this end alone. Only support of a joint system was feasible.

Hence by 1970 the group proposed that the Career Information System be a model inter-agency consortium that would provide practical means of direct access to current career and labor market information. This information should be presented, it was agreed, in forms that are meaningful to students and clients and useful to the schools and social agencies of the state. Their proposal was accepted by the U.S. Department of Labor which, late in 1971, funded development of the OIAS. In accordance with the original stipulation, the system is no longer supported by the Department but is now maintained by user agency fees.

The Consortium, still including the agencies that participated in the original planning of CIS but now enlarged, acts through a policy board. This body, the CIS Board, represents the sponsor agencies and also data-producing and user agencies. The Board's functions include policy formation and interagency coordination. It is to this Board that the CIS Director is responsible for his supervision of a staff that is selected to work directly in information collection and development, in consultation with schools and agencies, in system management and in facilitating the integration of career information into agency and school counseling as well as instructional programs.

The CIS Board chose to locate its staff at the University of Oregon within the School of Community Service and Public Affairs. While the University acts as fiscal agent for CIS and performs many managerial services for it, the staff is permitted to accept its policy direction from the CIS Board.

CIS now holds over 100 contracts with user agencies, both schools and social agencies, whose jurisdictions range from very small areas to the Portland district. It has grown from a small experimental project which in FY 1971 provided services to 1,000 students and clients, netting zero dollars in revenues, to serving 142,000 individuals in FY 1975 and earning $272,000.

Presently, the system is used in more than 330 different schools, agencies and institutions in Oregon including all thirteen of the state's community colleges. Approximately 180,000 people are expected to use CIS in FY 1976.

Major Components of the System

OIAS is composed of five interrelated information components. These are:

1. QUEST: An introductory questionnaire that helps students and clients to explore occupations related to their self-assessed interests and abilities. This twenty-five item questionnaire is completed off-line by the user and then entered into the computer by way of a teletypewriter where the user is presented the same list of questions.
2. Descriptions: Brief 300-word summaries about each of the 225 occupational categories in the system. (These categories encompass approximately 3,000 of the 4,000 detailed Dictionary of Occupational Titles' nine-digit codes represented in Oregon's employment, and they include those accounting for an estimated 90 percent of the state's employment.) The descriptions emphasize local as well as state and national information about jobs and worker qualifications, and the summaries are subject to immediate revision as well as periodic update.
3. Education and Training: Identifies educational and training opportunities in Oregon for each of the occupations in the system. This component consists of a Program File, a School File and it is being expanded to include a Preparation File.
4. Bibliography and Books: Refers students to the most pertinent general and specific publications for each occupation in the system.
5. Visits: The names of local people who are available to discuss their respective occupations with individuals who wish to supplement the information gained from the other components with personal contacts.

Theoretical Substructure of the System

We have heard OIAS criticized on the grounds that it does not rest upon a sound base of sophisticated theory. Also, it has been characterized as grounded mainly in trait-factor theory.

To us, such criticisms appear unmerited. To be sure, the mechanism whereby a list of occupations is presented to the student is the QUEST questionnaire, and the process by which this list is constructed may be considered as reflecting trait factor theory. However, every system must employ some scheme of linking user attributes to job specifications as a means of access, unless the user is simply to enter the system with a predetermined choice of occupation or to take his cues from a "laundry list" of occupations available beside the terminal.

Some critics complain that OIAS provides no modules designed specifically to "teach values" or to "teach decision-making." It can be argued, however, that the tendency of users to re-evaluate their preferences after receiving the list of jobs presented for their further consideration represents, in essence, a creative manipulation of the system leading to increased self-awareness in relation to the occupational decision-making process. Users become aware of how their responses to questions affect the range of occupations appearing on their lists. As they go back to their questionnaire responses to learn which replies regarding their interests, abilities and preferences barred given occupations from their lists, an educative process takes place. It is this process that induces self-reflection and an understanding of the decision-making process that is quite apart from the information provided when the list is utilized to trigger the release of occupational descriptions.

It appears unwarranted to us to characterize a computerized Career Guidance system as to its theoretical substructure purely upon the basis of its processing logic and its information files. The setting within which the system is used must also be taken into account. OIAS is a mainstay of Career Education in Oregon, an approach to education resting solidly upon developmental theory.

Finally, the developers of OIAS have justified the fact that this system is essentially an information system rather than a counseling system upon the grounds that vocational guidance can be implemented only through the use of sound, current, appropriate Occupational Information. To buttress the view that the possession of such information is a necessary part of the vocational developmental tasks of crystallization and specification as well as a spur to occupational exploration, a number of prominent theoreticians from Ginzburg to Super are quoted on this point in a publication describing OIAS. (7)

Quite probably, the theoretical basis of this system as of the others that follow may best be described as "eclectic." Or, if the distinction that Donald E. Super makes in the theoretical bases of guidance systems is followed, OIAS can be considered as employing the "pragmatic approach." As such, it is essentially an "occupational model" although it can lay some minor claims to being also a career model based tenuously in developmental theory.*

Means of Access

As mentioned above, the instrument used to gain access to the Occupational Information stored in the computer is the QUEST questionnaire.

QUEST is regarded by its makers as a questionnaire, not as a test. The constructs upon which it is based are those of traditional occupational and labor market analysis, and the questionnaire utilizes the empirical results of this analysis in order to link occupations to an individual's attributes and preferences. For the most part, QUEST uses the worker traits identified for occupations in the Dictionary of Occupational Titles. The rationale of the interest questions is based on the relationships between data-people-things and specific occupations as expressed in the DOT occupational classification system. Standard labor market data sources are used for factors of regional location, city size, amount of education, and salary.

---

*See Chapter II, p. 25.

If the user gives a response to a question (e.g., as to interest, acceptable job location, salary level, or physical capacity) that is consistent with a factor critical to the occupation, that occupation is retained and will be presented to him. If his response is inconsistent with a critical factor, the occupation will not appear on his list. The user, however, can ask which of his responses eliminated any particular job from his list; he can alter his responses to obtain a new list; or he can request directly information regarding any occupation included in the system.

Opportunities to perceive the relationship between one's preferences and limitations and the occupations that are consistent with them are, if anything, magnified when the user is working with the Needle-Sort rather than the computerized version of OIAS. A single limitation respecting location or salary, for example, can bring about a vertiable cascade of cards from the universe deck, representing occupations that are not to be considered because their requirements or characteristics are inconsistent with the user's limitation.

Following this matching or linking of user attributes, preferences, and limitations with occupations to which they may be applied, the user in areas served by the computer may explore by teletypewriter those occupations he wishes described. The resulting print-out is his to keep.

In areas that are not served by computer (primarily in the smaller, rural school districts) the user also gains access to written materials describing occupations and educational opportunities.

Occupational Information

Occupational Information is retrieved by the user in the form of 300 word job descriptions. These include concise statements concerning the nature of the job, working conditions, worker qualifications (including the education and training required), employment and earnings, and employment prospects. Although the descriptions are written in a style that is common to occupational literature, high school students in a series of system evaluations overwhelmingly reported the information interestingly and attractively presented--possibly because the teletypewriter is a delivery medium that is more than usually attention-holding.

The various subjects covered in the job descriptions give the national, state and local picture of the occupation. Localization is emphasized in the Oregon system as in no other unless VIEW (which is not computerized) is included. The local emphasis is defended by OIAS staff on several counts.

They maintain that localized career information has the very great advantage, whatever the level of the occupation, of "giving the high school student something he can identify with." It makes the entire body of information, including the national data more realistic and, therefore, more credible to him. Further, there are substantive and very real differences between geographic areas in certain critical components of Occupational Information including such matters as "life style," wage rates and employment outlook. If the description relates solely to the national scene it can be more than a little misleading. The OIAS staff argues that "everything averages out when too large a geographic area is selected for coverage." In fact, they are loath to present even statewide data, prefering to "deal with the state as an aggregation of areas."

Timeliness of the data is also stressed. Annual review of the information files involves both OIAS staff and the services of a review panel for each occupational category (consisting of workers, employers, placement specialists, training or education representatives and expert observers) to which questions are directed and from which answers are received by phone or mail.

Weekly updating with current information, however, is also employed. The volume of this updating depends upon the flow of information to system headquarters, particularly for such highly perishable topics as wages and employment outlook. Every effort therefore is made to enlarge and to be attentive to this inflow of new data. The writer was in Oregon within days of the press release of an announcement that the employment outlook for astronomers had deteriorated markedly from that indicated in earlier published projections. Upon inquiring, we learned that the occupational file was entered the day the release appeared and the national projections were appropriately revised--a performance that compares most favorably with systems whose job descriptions are revised no more frequently than biennially.

Accuracy of the job descriptions is prized even more than their localization and timeliness. The OIAS staff has various advantages in striving for this goal. It has been rigorously trained and is experienced in the discipline of labor market analysis. It enjoys close cooperation with the analysts of the Oregon Employment Division who, in turn, profit from the output of their agency's more than ordinarily active and competent labor market information program. And the net work of review panelists who supply their counsel in connection with the job descriptions adds immeasurably to their authenticity.

Educational Information

The files containing information about education (limited to that offered by Oregon institutions) have been substantially revised since inception of the system. Originally, educational and training opportunities were linked to the various occupations included in the occupational file. Now, however, there are three new files. These new education components incorporate several important changes from the previous and usual type of Educational Information.

All educational programs are included, not only those that have occupational titles. This expansion requires that educational programs be organized in an educational taxonomy rather than in occupational terms. The introduction of an educational taxonomy into the system means a more complete discussion of the relationship between education and jobs in each occupation. And detailed and comprehensive information about the costs and services of schools is also now presented.

One of the new components is the Preparation File. This file describes how to prepare for employment in each of the 225 occupational categories included in the system, and it will reference the relevant educational program.

Another new component is the Program File. This file provides narrative descriptions for each type of post-secondary educational program in the state. It also lists the Oregon institutions that offer such programs.

A third new educational component is the School File. This file provides comparative data on all two and four year colleges and nearly all proprietary schools in Oregon.

In developing these new files, OIAS staff encountered all of the difficulties that beset those attempting to link educational opportunities to occupational preparation. In Oregon as elsewhere, it is difficult to locate detailed and accurate information relating careers to educational opportunities and to the schools that offer them. Existing post-secondary Educational Information rarely speaks to the career opportunities generated by attending a particular school or enrolling in a particular program. And when such references are available they are frequently unreliable. Hence, it required much original research and a multitude of special arrangements with Oregon's various educational institutions in order to set up the basic files and to insure their continuing accuracy and currency. To this end, an advisory committee has been constituted that is composed of institutional representatives and state agency personnel.

It should be pointed out that these arrangements and contacts are required not alone to acquire an inflow of data concerning educational opportunities. They are also needed to obtain enrollment data by program, one source of information about projected labor supply that enters into estimates of future labor demand/supply relationships by occupation.

Student Information

A computerized Career Guidance system can contain a large volume of information about the student who uses it: his interests, aptitudes, values, and course grades are examples. The inclusion of this information enhances the degree to which the system can be characterized as interactive. Presumably, it also affords the machine a potential to assume more of the counselor's functions rather than merely to supplement his information-delivering capabilities.

The only information about the student acquired by the computer in OIAS is his responses to the QUEST questionnaire and these responses are not stored in the system. As emphasized above, QUEST is not regarded as a test but merely as a route of access or a sorting device.

Among the advantages cited for this approach is that of privacy. It is argued that safeguards cannot be designed that will guarantee the user's privacy sufficiently (or that will adequately assure him of the complete confidentiality of all information pertaining to him) given the fact that OIAS is used in Oregon's social agencies as well as in its schools. In this connection, it is of interest to note that evaluations of the system show that student users appreciate the simplicity of the system which permits them to conduct their sessions with the teletypewriter alone and unassisted by counselors or other attendants.

Hardware and Performance

Originally, OIAS operated on a hardward configuration that was much larger than needed. Therefore, the system was recently converted from use of an IBM 360/50 with Teletype Model 33 Terminals to a Hewlett Packard 2000 (models C and F), again using TTY 33 Terminals. The original program was written in IBM Assembler Language; the software is now written in Time-Shared Basic. Programs, however, are currently being rewritten by the University of Oregon Computing Center for operation on other equipment, including Xerox, CDC and PDP for use at two centers within the state and for some users out of state.

The CIS has made a practice of contracting for computer services from established educational computer centers. The Occupational Information delivery system operates on five computers at five centers in the state.* Three of these form the Oregon Total Information System (OTIS) which is operated by the Lane Intermediate Education District for schools throughout the state. The others are the Multnomah County Intermediate Education District (METCOM) for schools in two counties of the Portland Metropolitan Area, and the Washington County Intermediate Education District.

The system uses about 55,000 words of computer core on an HP 2000 (models C and F) plus one cartridge disc drive. In the computer center, costs of operating the program are not isolated from the costs of operating the entire Hewlett-Packard computer system which includes other programs as well.

Pilot testing and implementation of the computer version of the system has consistently identified down-time as a problem and a continuing source of complaint. A major step in correcting for down-time, however, was accomplished with the change of the OIAS program from the former computer to one specifically designed for time sharing.

It should be noted that user institutions in addition to their contracting for terminal time and rental of the terminal must arrange for telephone line transmission in order to complete their systems.

---

*The November 15, 1975 edition of the CIS newsletter, UPDATE carries an announcement that "computerized CIS is now available from seven computing centers in Oregon. More than 130 different sites are using the computer to deliver CIS; more than 200 use the Needle-Sortsystem; many use both the Needle-Sortand computerized delivery systems.

A different and much more modest type of equipment can be obtained by those schools and agencies whose size, location, budget or preference prohibit the use of the computer system but which nonetheless wish the services provided by CIS. The Needle-Sort version of OIAS (Needle-Sort deck and occupational and educational printouts) is supplied at cost by CIS to this version's users. A policy of renting this delivery device was adopted to insure the updating of cards and the supplying of revised printouts in exchange for the outdated materials. The exchange occurs annually for the Needle-Sort decks and education files and quarterly for the occupational descriptions.

Relationship of System to its Setting

The OIAS is used for Career Guidance not only in schools but also in social agencies. In this discussion we shall be concerned with its use only in Oregon's secondary schools.

Earlier in this chapter we quoted an author who discussed the hazards of evaluating the utility of computer-assisted counseling without taking into account its place within the context of the guidance program, the school, and the community. Important measures of the place the system occupies in this complex setting would appear to be student use of the system; the actions and attitudes of counselors, teachers and school administrators; and the approval given the system as well as their cooperation with it by individuals and groups in the outside community.

Obviously, and for several reasons, these measures as applied to any Career Guidance system will vary from school to school. No matter what the enthusiasm of top level administrators for the system they have adopted, student usage will differ at each school under the influence of such variables as physical location of the terminal; the amount of free time left to the student, a function of class scheduling; and the emphasis placed on student use of the system by teachers and counselors. Counselors and teacher attitudes also will vary at each location depending on the amount and kind of in-service training received as well as because of many other factors. We observed differences in student usage of the system and in counselor and teacher attitudes in three high schools we visited, two of them utilizing teletypewriter terminals, and one, the Needle-Sort version of OIAS.

Nonetheless, it can be stated that these variations cluster about a high level of system utilization, approval, and integration within the larger guidance program and the outside community because of general factors characterizing OIAS or affecting its use, irrespective of its location.

For one thing, users of the system find the system attractive as shown by numerous evaluations and as demonstrated in our own observations. QUEST has much appeal as a way of initiating occupational exploration. Consistently in field tests, over 90 percent of the students find the questionnaire "fun to use." They value the hard copy they receive describing the occupational and educational opportunities they explore and unfailingly take this material with them when leaving the teletypewriter. Evaluations have shown that the results of their sessions at the terminal lead to discussions with parents at home that both students and parents value.

Ease of usage is another attractive feature. The system is designed for student (and agency-client) use without monitors. High school students overwhelmingly rate the system "easy to understand" and "easy to use" without staff surveillance or prompting. This ease of operation makes it possible for the system to be used without assistance which, in turn, increases its privacy--a feature that they appear to value. It also reduces the costs of system operation since counselor time can be husbanded for supplementing the information-giving function and used for providing types of assistance beyond the capabilities of the machine.

The attractiveness of the system is, in general, demonstrated by the heavy usage it receives at the high school level even when no particular effort is made to publicize its presence. Frequently, the chief complaint of students regarding the system has been the waits they experienced when attempting to use it.

Evaluations of Occupational Needle-Sort usage have produced results that are similar to those obtained respecting computer system usage. Students rate it as "easy" or "very easy" to use and as an effective aid to occupational decision-making. This version has a further attractive feature in its mobility. Counselors and teachers find it easy to use in office and class-classroom, and some schools encourage the students to take the set home where they and their parents can work with it.

Other OIAS components are also attractive and effective though they do not receive the heavy usage accorded QUEST and the occupational and educational components.

The Visit file is shown by computer use records to be accessed by a third or more of all system users. Thus, in Lane County where there are 12,000 CIS users, 400 to 500 make individual visits to workers in occupations they are exploring. An additional 1,000 to 1,500 students, in groups, hear from Visit file people, and there are uncounted telephone interviews.

Such usage of the OIAS component has several implications as to the setting in which the system operates. Annual questionnaires to the individuals who are visited show that the people giving this service regard it as a worthwhile experience for themselves and that they assume their visitors learn enough from the contact to justify the time they expend on this activity. Opportunities for this type of career exploration are highly regarded by teachers, counselors and Career Education Coordinators as they add greatly to the strength of guidance programs.

Efforts are now being made to add many more names to the file with the objective of having at least one resource person for each occupation. And in areas of the state where local visit files have not as yet been established, the desire to have such information available tends to develop during the second and third year of system operation. This desire sparks the development of local initiative, with school districts and service clubs undertaking to conduct the necessary community resource surveys needed for establishing these files, strong evidence, indeed, of community cooperation.

The final component of the system now in use is the Bibliography, a carefully selected listing of publications believed to be particularly helpful in expanding the user's knowledge of the occupations in which he has an interest. A summary of component usage conducted on a sample of schools connected to the OTIS computers has shown that 19 percent of all requests to the computer for any of the five components were made to retrieve a bibliography.

Although this usage is small as compared with that of the more popular components such as the Occupational file and QUEST, it is nonetheless significant. For one thing, this 19 percent usage of the Bibliography represents a doubling of its use from the time when it was in notebook form during earlier evaluations. Also, even though there is no way of determining whether or not the students actually read the books referenced in the bibliography, it does indicate that a significant number of them are interested in obtaining additional information.

This interest in obtaining more information in no way appears to related to any lack of satisfaction with the occupational descriptions that the students receive by way of the computer or card sorts. A detailed study on this point at a typical high school showed that virtually all the student users thought the descriptions fun to use, easy to understand, accurate, and up-to-date. Substantial majorities also said that the descriptions related to their personal interests, values and abilities, and that they were complete. As students are harsh critics of occupational materials when they appear incomplete or lacking in timeliness and accuracy, this judgment of the descriptions represents a real tribute to the data base of the Oregon system. It is also a compliment to the many advisory committees, review committees and the like that evidence community involvement with the system by expending their time to enhance it.

The general characteristics of OIAS cited above were apparent in each of the three high schools where the system was observed. The way in which it was embedded in the overall counseling program, however, differed at each school. At one school, the counselor (one of four) who served as the "occupational specialist" maintained that, because the school has OIAS, its counselors are free to spend the time that they can give to Career Guidance--about 30 percent of their total time--much more profitably than if they also had to provide detailed job information. She, for example, was giving a well-attended, even though no-credit, course on "Career Exploration." In this class, she said, "the students work on values and on decision-making and as they become interested in occupations they go to the machine for job information." Counselors in their Career Guidance of students are able to concentrate on conferences with the student "after he has used the machine" and to give him supplementary explanations and information if he wishes it.

The counselor pointed with pride to the open and attractive area in which the teletypewriters were housed and commented on the heavy use that they received. She also mentioned the use that some teachers make of the machine, particularly those whose courses lead to health and business occupations, in order to gain information that can be incorporated in their courses.

At another urban high school the situation was quite different. There, the head counselor praised the system because she did not view counseling as giving out Occupational Information. She saw counseling as persuading students to "figure out their values, learn decision-making and decide where they are going from here. But after that, the machine can take over."

Despite the fact, however, that the system was welcomed at this school because it could and did "take over," its use was much less than at the first high school. Reasons given for its lesser use included the out-of-the-way location of the teletypewriters, the small amount of free time given the students at this school, and the fact that 85 percent of the students go to college; teachers of academic subjects are evidently not as likely to encourage use of the machine as are those in the more vocationally oriented disciplines. Further, because of poor administrative practices the counselors at this school spent an inordinate proportion of their time on educational programming. The head counselor believed, however, that in the ensuing school year improvements in these procedures would reduce the time spent by counselors on programming by three-fourths. Also, it appeared that a course on careers might be given where use of the machine could occur during class time.

The third school visited was a rural high school in a very small and relatively remote community. The Needle-Sort version of QUEST is used at this school together with a back-up of system materials on occupations and educational opportunities.

It was at this school that we observed the highest level of enthusiasm for a Career Guidance program and the most complete integration of the program into course content and school activities that we have seen in any school that we have ever visited. Rather than using this school's isolation from a metropolitan center, or its size, as an excuse for a weak guidance program, it was used as a compelling argument that there must be a strong one.

The school's Principal, Career Education Coordinator, Counselor and the teachers were all of them deeply involved in Career Guidance. Every staff member including the Principal was responsible for some counselees. There was a one-year "Career Exploration Course" for freshmen. In this course, the career clusters most significant for this community were covered in great detail. Students whose interests were primarily academic were encouraged to explore professional occupations on their own and to write papers or give talks about them.

A chief function of the counselor was establishing liaison with any individual or group in the community that could assist in the program. Because of the nature of the guidance program, this activity, he insisted, is of greater importance than it might appear, given the town's size and its simple economy. As examples, the students are "building a whole house in the town" as part of their exploration of construction occupations. Many negotiations are required with builders and unions so that all will go smoothly, and so that those students who later wish to undertake them can be fitted into apprenticeships. A new plant employing a modern technology has entered the community and good relations with this firm have paid off in jobs for students and in more knowledge for the school staff about job requirements. The counselor is also using his contacts to gather career information for the teachers so that it may be incorporated into their courses.

The only dissatisfaction voiced by the staff was their feeling that their school, too, should be served by the computer. They liked the Needle-Sort and would retain it even with the computerized version. But they believed that the students in their valley (four high schools, none more than eleven miles from a hypothetical center) should have a computer. These schools have not been able to decide how they can share the cost of computerized service, as setting up a terminal at the central point is too costly for their budgets. They will likely acquire one and rotate it quarterly among the four schools.

That they will have one appears certain. As one school staff member said,

> *"No single counselor or even a large group of counselors plus all of the teachers can ever have at their command the masses of detailed data that can be accessed immediately, simply by asking the computer. This means that a student from ________ can have his horizons widened just as much as a student from Portland or from anywhere else in the country. This is the key; having a computer means widening a student's horizon by letting him use a tool that he likes and that gives him instant playback. This means a lot to a kid from here."*

Transportability

From the outset, CIS was meant to be transportable. Originally, this term meant the spread of the system from the original project site in Eugene, Oregon to other areas in the state. To this end, various "marketing strategies" were involved, primarily so that regional groups rather than individual schools or agencies could be dealt with. Several safeguards were developed such as requirements for adequate in-service training and incorporating the system into ongoing courses and counseling practice whenever appropriate and feasible. At the same time, a growing list of services for the users was developed, including a newsletter, the training provided by CIS staff, and now a management information service.

As use of the system advanced, it became necessary to restructure the entire set of information files to separate localized from non-localized information. With this done, as much of the information as possible also became portable, and only clearly demarcated and minor bits of information required changing or substitution in moving from a Portland to a Coos Bay, for example. The University Computing Center's work in rewriting the programs for operation on a variety of equipment has also enhanced the system's transportability.

Now that the Department of Labor's NOIS program promises to accelerate the spread of CIS to other states,** a larger issue must be faced than that of

---

**According to the November 15, 1975 edition of UPDATE, the CIS newsletter, Washington and Colorado, among the NOIS recipients (and Iowa and Tennessee in other independent efforts) are utilizing Oregon's programs (as modified with an appropriate localization of data) and other states will soon follow.

compatible hardware and the services provided by the CIS staff to new user agencies. For OIAS to become truly operable in states other than Oregon, their capabilities for local information development must be greatly increased over the level currently characterizing most states. As one authority on guidance has stated in connection with the transportability of OIAS:

> *"Very few areas in the United States have existing agencies that do an adequate job of collecting and synthesizing local occupational information for career planners."* (8)

Costs

It is clear than any account of the costs of a computerized guidance system, ideally, should deal with more than the incremental costs of completing the flow of labor market information to decision makers. But estimating the total costs of a designed labor market information system is no more feasible than estimating the very real costs of a non-system which produces substantial social costs and results in a significant underutilization of much of the costly labor market information that is developed.

According to Bruce McKinlay, Project Director and chief developer of the Oregon system,

> *"Two principles underlie the financial side of the Career Information System's development. One is that the Career Information System will devote its resources to activities that will bring together various unrelated research and information activities into a 'system', with a special emphasis on the delivery of information to individual career decision makers and manpower program planners. Thus, emphasis is placed on information development and delivery rather than on original research. The second principle is that the System should be developed in such a way that it can be sustained in the long run by the institutions it serves."* (9)

Start up costs of the system in Oregon were primarily in the form of staff time and would vary greatly from state to state. The CIS was particularly and peculiarly fortunate in being able to build on much excellent work that had already been done by the state's Employment Division. Two key staff members had previous experience with that agency and the latter's manpower economists stationed throughout the state contributed their advice and assistance

Although per student costs of OIAS are commonly quoted at between $2.00 and $3.00 per year, with typical usage estimated at between twenty and thirty minutes per student, costs actually can differ widely by institution depending on the level of usage and the various arrangements that are possible to gain economies of scale.

The typical school or agency installing a terminal to serve 1,500 users, and paying terminal costs, line charges and computer time as well will spend about $3,250 per year or $2.17 per user. If a school can employ an existing terminal, it will pay only the cost of computer time which averages out to about $1.00 per user per year. There are also additional user service fees, however, which average forty-seven cents per user per year and which pay for continuing information development and maintenance, for training, and for a variety of written materials such as the CIS newsletter and the training given by CIS staff.

Schools and agencies that use the occupational Needle-Sort version (Needle-Sort deck and printouts) pay a $45 rental per year for a single deck of cards. This charge drops well under $1.00 per student per year as the number of users reaches the optimum for a single deck.

Evaluation

A fairly large literature exists describing evaluations of OIAS. One work,(10) a research report, brings together the results of various formal evaluations, theses, and special studies that have been made from time to time. Accounts of these studies, appearing in this report, have formed the basis of comments made above regarding the volume of usage of the system and of student satisfaction with its use, as well as the attitudes of parents and counselors regarding the system.

Possibly a more significant contribution to the field of evaluating computerized guidance systems, although it treats only one aspect of the system, is McKinlay's work describing access to the OIAS. (11) He bases his findings upon extensive empirical evidence gained in field tests conducted in both schools and employment service offices. And he amply demonstrates that the conventional readability tests do not appear to apply when used to gage the difficulty of occupational materials. The usual readability formulas when applied to the QUEST questionnaire and to the occupational descriptions yielded scores rating them as "difficult" or "very difficult." These ratings were by no means agreed to by either high school students or by disadvantaged adults when they were questioned as to the readability of these materials. Both groups, more often than not, rated them as "very easy" or as "easy."

The author also discusses the validity of using self-reporting as an operational procedure to gain access to the system. If self-reporting of physical capacity, interests and aptitudes is valid, the storage of various types of test data regarding the user within the computer would seem of dubious necessity, to say nothing of the costs involved and the possibility that invasions of privacy may occur. Tests were performed in employment service offices where a large proportion of the applicants were youths, many of them disadvantaged. These tests involved comparing the self perceptions of the respondents as to their characteristics with the opinions of employment counselors regarding them, and in some instances with the results of their having taken the General Aptitude Test Battery.

There was an 80 percent concurrence between the responses of applicants and of counselors. And where subsequent checking against GATB scores was possible, the counselor's original estimate was as often proved to have been incorrect as the applicant's.

From his own findings and from recent research on the subject, McKinlay concludes that self-reported interests, abilities and other personal factors are as likely to accord with objective reality or to constitute valid indicators of performance as are the measures acquired by formal testing. Upon this basis he supports the independent use of the QUEST process by students and clients believing their responses close enough to reality to be useful in generating an occupational exploration list.

Conclusion

Each of the computerized Career Guidance systems, seemingly, has its own personality, possibly reflecting the characteristics of its progenitors and the circumstances of its development.

OIAS is in many respects the labor market analyst's system. In no other system is equal concern manifested for the soundness, timeliness and local detail of the employment information delivered. Few systems approach it in the degree to which the computer-based information retrieval component of the larger information service is so firmly embedded in the total counseling program and in the community. This latter feature appears due, in part at least, to the strength of the Career Education movement in Oregon, and also to the fact that the schools and agencies served by the system must pay for it.

Our questions regarding the particular applicability of this system to the counseling of science students received replies that were strongly reminscent of the responses of career educators and employment security research chiefs to similar inquiries.

It was argued that efforts to improve the Occupational Information given to all students would assuredly improve the guidance provided to science students. In addition, where specific problems of data development were affecting the descriptions of science occupations, these were cited together with the steps being taken to resolve them, if possible.

The efforts made by CIS to facilitate the incorporation of career information into the curriculum and to promote career exploration by way of the Visit file were described as particularly beneficial to science students. This opinion rested upon a belief that teachers in the sciences and humanities, like counselors, frequently minimize the need of the college-going student for realistic career information.

One official in the state Employment Division believed, although he could produce no proof for his theory, that science-oriented students are particularly fascinated by computerized information delivery. He stated that some teachers of science and mathematics do encourage their students to use the system--and they do so on the grounds that its use will give the students "at least some experience with a modern information system."

2. ECES - THE EDUCATIONAL AND CAREER EXPLORATION SYSTEM

Introduction

"Your career is the way you live your life," is a phrase that frequently greets the student user of ECES in the multimedia presentations characterizing the system. These words are indicative of the system's close relationship with Career Education concepts. According to its developers the American Personnel and Guidance Association after reviewing ECES II and its results, in 1972 dubbed it "the Career Education system of the 80's." (12)

The sequence in which the user follows the components of the computerized portions of the system; the system's place in a general counseling program that adheres to such practices as career-oriented instruction, internships and student job placement; the firm ties that exist between the guidance program and the community--all speak to the fact that ECES is the career educators' system. Probably helping to explain this strong orientation was the system's origin in a problem often facing vocational educators and also the fact that Career Education is mandated by the legislature in Michigan.

Background and Organization

In 1968, the Genesee Intermediate School District, coterminous with Genesee County, Michigan, including twenty-one K-12 districts, was in the process of building a Skill Center. The center was to be a large vocational high school with thirty vocational curriculum areas to which all twenty-one high schools would be able to send their students. There, they could spend one half of each day taking vocational courses in a program largely reimbursed by the state.

Vocational education officials in the district soon became seriously concerned that they did not possess a guidance program capable of supporting this level of instructional effort. In the late sixties. the then District Director of Vocational Education, Alva E. Mallory, found ECES being field-tested in the Montclair, New Jersey High School. He approved of the system for the Genesee district and, with both public support and substantial underwriting from the Mott Foundation, ECES was installed in Flint.

Work on ECES I had been initiated in January 1966 by the Advanced Systems Development Division of the International Business Machines Corporation under the direction of Frank J. Minor and Ted Friel. Project consultation was provided by Donald E. Super and Rogers A. Myers of Teachers College, Columbia University. Evaluation of the results of field-testing the system in Montclair in 1969 showed that the students had acquired a significant amount of career information and that they and their parents had most favorable attitudes towards the system. However, the evaluation also indicated that the students' vocational maturity had not increased in terms of their ability to make better career decisions or more comprehensive career plans.

The revised version of ECES I brought to Michigan, when evaluated, again did not appear to improve appreciably the vocational maturity of student users. Meanwhile, IBM discontinued development of ECES and placed the computer application program in the public domain.

Development of ECES II (with the help of Robert R. Carkhuff) focused on equipping counselors with the competencies needed to deliver career development skills. Components were also introduced into the system to convey decision-making skills systematically. According to the developers, follow-up studies have consistently demonstrated a greater quantity and quality of self and career awareness, career decision-making ability, and career planning ability by ECES II users than by members of control groups not using the system.

The newest version, ECES III, represents a further revision of the original system in that its data base has been enlarged and improved and hardware now presents minimal problems. The continuous effort to embed ECES even more firmly into general counseling and instructional programs is also reflected in its newest version. The system is operated under the authority of the school district and is closely integrated with VIEW which concentrates on providing local job information. There is evidence of working towards a common data base for the two systems and, with the receipt of a NOIS grant by Michigan, hope that there will now be more assistance than was possible formerly from the state employment agency in developing this local information. At the time of our site visit, Genesee school district officials had expectations that receipt of this grant would lead to a state-wide system featuring a combined ECES/VIEW program. Whether or not this expectation will materialize is as yet unknown.

Major Components of the System

The three basic components of ECES III are the computer-terminal-microfiche-reader subsystem, the instructional module subsystem, and the counselor-teacher-monitor subsystem.

The computer-microfiche subsystem consists of six steps:

1. Self exploration--during which students are introduced to various search strategies designed to increase their awareness of self and of what they want in life.

2. Career expanding--in which they become aware of the many career alternatives from which they can choose. In exploring occupations, students see on-the-job scenes, occupational descriptions and cartoon quizzes about specific job characteristics which are displayed in color. They can also investigate the educational preparation required to enter specific occupations, whether high school courses, post-secondary majors at trade-technical schools, community colleges, four year colleges, or universities.

   Four "libraries" of information are stored for retrieval in this subsystem. These are Occupations, Majors, Charts and the Vocational-Technical School and College Finder.

3. Self understanding--a step designed to teach students how to handle the new information obtained in the previous steps. This is attempted by means of a computer-assisted instructional program on career decision-making, intended to help students develop their values. They learn to assess the importance of each value to themselves and to use each to decide how well their various career alternatives meet their needs.

4. Career narrowing--where students use their decision-making skills to make tentative career choices. Computer feedback is used in the form of occupational decision tables and post-high school major decision tables. These are based on the answers previously given ECES during the exploration of relationships between values and career alternatives.

5. Self-actions--a step in which students test themselves to learn if their career choices actually meet their needs--both by way of computer interaction and a "Day on the Job" experience (which may be considerably longer than one day).

6. Career-preparation--the step in which students prepare themselves to meet the entrance requirements of their tentative career choice. They develop a plan including the courses, majors and schools that will prepare them for their career selection, and work out with counselors, teachers, and parents the programs needed to develop the skills that will give them a start on their plans.

The instructional module subsystem consists of several modules that the counselor or teacher may use in a group guidance situation. These instructional units focus on expanding career alternatives by exploring self and careers, understanding and weighing each alternative, and then providing a step-by-step breakdown of short-range goals the student can act upon. Emphasis is on the skills acquisition necessary for action.

The counselor-teacher-monitor subsystem is based upon skills that have been taught to the counselors, teachers and monitors working in the ECES III career development skills program who are charged with ensuring the growth of the individual student throughout the entire ECES process. Those involved with this subsystem are taught empathic listening skills, accurate communication of feeling and content, and the ability to initiate. They learn to work in both individual and group situations and to assist students to act upon the responsibility that they have for their own decisions.

Theoretical Substructure of the System

The origins of ECES ensure that it is firmly grounded in developmental as well as trait-factor theory. Its revisions and their implementation have been largely guided by Career Education concepts and practices.

The system focuses not only on the steps derived from developmental theory that are believed to lead to vocational maturity through self-assessment, career exploration, decision-making and planning. It also stresses career-curriculum integration programs designed to make courses more meaningful in terms of student career plans. It includes skill building programs necessary to job finding, job maintenance and job growth, and it embodies the concept of internships. Its developers are now concentrating on the initiation of placement services and on-line job bank programs to enable the student to search potential employer situations, as well as allow employers to search out potential student applicants.

Means of Access

Before using ECES the student is briefed by his counselor and terminal monitor. He has already taken a special aptitude (VPI) and interest (OVIS) test and he receives these profiles along with a "Search Strategy" which has been printed by the computer as one suggested plan for exploring occupations and majors. The student record in ECES includes courses, grades received and a general learning test score. In addition to the information stored in the computer, he enters his own self-estimates during his participation on ECES.

During an on-line orientation session the student learns how to operate the terminal to direct the computer. He uses an electronic light probe to touch the screen of the optical image display terminal which calls up pictorial information concerning occupations that interest him. This visual information is contained in film strip cartridges that the student inserts into the terminal. He also learns about the various charts that are available to assist him in interpreting the information he has received via cathode ray tube or film strip.

Access to Occupational and Educational Information is highly structured for the student when he first enters the system. Information about him that has been stored in advance of his contact as well as his initial self estimates influence the first occupations he receives for considerations. But after a period of use he is free to call up information on any occupation he wishes to explore.

Occupational Information

In ECES, occupations are initially selected for student consideration by matching jobs to interests as measured by the Ohio Vocational Interest Survey as well as to self estimates of abilities and work values. Occupations are classified on the basis of worker trait groups (e.g., people-data-things) and by educational level.

After the user indicates the number of occupations he wishes to explore, he is led through a sequence of occupational descriptions, cartoon quizzes and pictures of on-the-job scenes, all designed to give him a vicarious experience of the occupation.

Presently in the system are 320 occupations that are national in scope and of general interest. An additional forty relate primarily to the Michigan economy such as jobs in the auto industry. Forty more are being added to round out the occupational file. These are jobs in which students, counselors or teachers are showing an interest; their absence means a gap in the classification structure,or they are emerging occupations. Systems staff prepare the job descriptions which thus far have primarily been rewrites of national data. As mentioned previously, it is hoped that one result of the NOIS grant will be an input from the Michigan employment agency leading to the inclusion of more local data in these descriptions.

In addition to the narrative treatment of jobs appearing on the CRT, about 400 occupations can be illustrated with 18,000 individual color film images. Also included are more than 1,000 on-the-job pictures showing real work situations together with 1,000 problem situations that people in these occupations must solve--all of these designed to give the student a "feel" for what it is like to engage in the occupation.

There are no formal verification procedures to reconcile the information from different sources (Occupational Outlook Handbook, OTIS information purchased from Oklahoma, and state and local information acquired from VIEW) or to ensure its currency. Again, it is hoped that resources obtained through the NOIS grant, used to expand the Michigan agency's Occupational Information staff by two members, will make it possible to institute improved checking and updating procedures.

Educational Information

Self-estimates of aptitudes and abilities and the student's grade point average are the records used to predict success in training for an occupation.

The Educational Information presented to the user includes a component on majors that describes 400 post-high school areas of study. This file identified the high school and college courses required to qualify for a particular occupation with more than 6,000 courses described.

There is also an institution finder that enables the user to search for colleges, junior colleges or vocational and technical schools which offer majors or fields of interest he is considering. Included in this component is information about more than 2,000 institutions, giving their geographic location, size, entrance requirements, religious affiliation (if any) and housing data. At the time of our site visit Educational and Occupational Information was being prepared by ECES staff. There were indications, however, that deficiencies were perceived in this software which was as yet incomplete, and that other means of acquiring school data might be adopted.

Student Information

As mentioned above, ECES stores the results of various tests taken by the student; self estimates of his interests, abilities and values: and his course grades. The system also tracks his explorations, and displays feedback charts on the CRT to help him decide whether to recycle through a phase he has explored or to continue on into new informational areas.

While the student is using ECES, the computer prepares summary charts that are sent to the counselor, pinpointing those areas where the student is most in need of counseling.

The presence of a considerable amount of student data in the computer raises the issue of privacy. ECES staff assured the writer that this problem posed no difficulties. Each school has its own password known to the monitor and needed to open the system to data relating to its students. Each student has his own I.D. number. Thus, it would be difficult for an outsider to break in, for the monitor would probably know if some student were seeking to obtain data pertianing to another.

The counselor can obtain these data and, in fact, can learn much about the student's interaction with the computer if he wishes to do so, by inspecting the returned charts. However, it was stated that counselors would use these data "only enthically and constructively." Also, "it is difficult to see what harm can occur through the counselor's access to the type of information that is stored in the system while the student makes his way from grades 9 to 12."

Hardware and Performance

ECES runs on a leased IBM-S/360-40 computer located at the Genesee Intermediate School District Headquarters that is connected by four leased lines to nineteen student terminals. Dissemination media are a computer cathode ray tube with color and a microfiche reader. The program is now written in CICS with the language COBAL. In addition to the main computer and the CRT terminals, the system utilizes disk storage, a tape drive, and standard card reader/punch and line printer peripherals.

As to performance, ECES is characterized by systems staff as "very much better than ECES II on the score of downtime." Formerly, line noise was a real problem but recent debugging has led to performance in which such difficulties are minimal. Response time was described as "normally very good because jobs interfering with ECES would not be run during its prime hours of use."

ECES equipment is utilized by the district for administrative purposes as well as for Career Guidance. At present a new package is being developed that can be used for on-line course scheduling, bookkeeping and accounting, and for various types of financial and other record keeping.

Two of the smaller schools in the system are also using it for programmed instruction one half of each day.

Relationship of System to its Setting

So substantial is the amount of in-service training that precedes the introduction of ECES III to a user school, and so continuing is the interaction between district headquarters and school personnel that the system can only be described as completely embedded within each school's general counseling program.

One result of the attention given to training is that the anxiety of counselors regarding their displacement by a machine is considered to be a "non-issue" by

ECES administrators. Counselors, if anything, are said to "work harder" once the system is installed. However, they are freed from being librarians because "once on ECES III" students have the capacity to search large amounts of information themselves, assess this information, receive personalized feedback, and "ask endless questions which the computer is never too tired or too busy to answer." Meanwhile, the counselor through his receipt of feedback regarding the students' sessions with the system is able to assign them specific career exploration objectives and give them whatever other assistance is needed that only the human counselor can provide.

One ECES staff member reported that the district's counselors

> *"certainly appear to like the system although it has given a considerable push to counselor specialization. The 'Psychologist, Junior Grade', tends to move into the area of personal counseling and away from the vocational area. Those with a greater interest in vocational counseling move in and work closely with the system. The counselor most interested in the system is likely to become the 'ECES Specialist' for his school. As such, he becomes that school's representative to the ECES Coordinating Council, a body that meets monthly."*

Given the close relationship between ECES III and Career Education, it can be no surprise that teachers also receive a substantial amount of inservice training respecting the system and that they are also represented on the council. Teachers are said to profit from the fact that ECES III makes it possible for them to provide direction for their own courses as well at to build into them career development skill applications that personalize the course material for each student.

Further, the teachers gain from the amount of data contained in the system that can be retrieved to increase their own knowledge concerning the work world for which they are preparing their students. Their students, too, are very likely to be better learners and more motivated once they have explored through ECES exactly what the world of work will be like for them if they drop out of school prematurely or fail to acquire skills and knowledges equipping them either for available jobs or for continuing their education.

Since its inception, ECES has received much support from the outside community, including parents, labor and professional organizations, and the business world--another element of Career Education. Much of the latter support has been given through the Business and Education Council, an arm of the Flint Chamber of Commerce.

Transportability

In one study of the earlier ECES and other computerized systems in which the issue of transportability of systems is confronted, the author makes the following statement:

> *"In summary, despite some of its intriguing features, ECES seems somewhat impractical as a potential service. Although its use is expected to continue in Michigan within the near future, it is unlikely that ECES will be transported for use in other school districts or modified for use at other educational levels."* (13)

When ECES staff were questioned respecting this statement, the reply was that ECES III is "far more transportable than ECES II ever could have been." Were another area to "take on ECES", however, it would need to buy the software. Also, it would be necessary to install an IBM/360 and TASKMASTER, a telecommunications processing monitor.

It was regarded as completely feasible by the staff that ECES III, combining with VIEW in the use of a common data base, could become a state-wide rather that district-wide system. Were that to occur, VIEW would continue to emphasize local labor market information as is now the case, but it would remain the sole delivery system in only those Michigan school districts unable to provide computer terminals.

Costs

Final data as to the costs of ECES III are not yet available. It is believed, however, that costs will be close to those incurred in running ECES II. In that system two and a half hours of student time (somewhat under the average period of use per student) cost $4.25 (or from about $2.00 to $2.50 per hour of computer time).

These figures do not include costs of data development or of the administration of the system. The total allocation including these costs that was sought and received from the Michigan Department of Education for 1972-1973 amounted to $100,000. In addition, $166,000 was obtained from other sources.

Evaluation

At the time of our site visit, project staff were just beginning to score the evaluative materials gathered for ECES III. Evaluating this sytem was foreseen as a difficult task. ECES staff had found it necessary to design their own survey instruments because prior evaluations performed in connection with ECES II and the prototype model did not probe for outcomes of system use. These, of course, are of great significance, for changes in behavior must be regarded as much more important than measurements which merely show that those students who use a given system have acquired larger amounts of information than the members of control groups who did not use it. The question that it is hoped can be answered in the forthcoming evaluation are:

--*"Did the student learn to make a decision?"*

--*"Did he learn how to make a career plan?"*

In part, answers to these and other questions will be sought by way of interviews, and the interviewer rating methods have been developed as one evaluative tool.

It is possible that the evaluation of ECES III will show that use of the newer system actually does accelerate the development of vocational maturity while evaluations of earlier models only revealed that student users of ECES II gained in the quality and quantity of career information they had at their command. The 1971-1972 field trial and evaluation of ECES II (14), however, did indicate that a special group among the ECES users that received systematic training in decision-making skills by carefully chosen counselors made real gains in planning orientation, choices or resources for exploration, and in other decision-making skills. These findings suggest that use of ECES III may well prove to contribute significantly to the development of vocational maturity.

The 1971-1972 field trial besides the above also demonstrated that students who use ECES enjoy using it, find it easy to use, and feel that they benefit from it. Their parents are pleased with the system, want it to be available to their children and, most important, they become more involved in their children's planning efforts. Counselors in schools where ECES is available value it highly and believe that it has a positive effect on their students.

Conclusion

Consideration of a computerized Career Guidance system for the Genesee Intermediate School District was sparked originally by the need to find a better basis for the planning of vocational education curricula in connection with the district's new Skill Center. The ECES computer continues to be housed in the district Office of Vocational Education. Nonetheless it would be a mistake to view ECES III on that account as narrow in the scope of occupational and educational data stored in the system or lacking breadth in the counseling approaches embodied in its software. The ECES motto, "A career is the way you live your life," is an affirmation that this system is built upon the broad interpretation of Career Education concepts, not upon a narrow vocationalism.

Thus, when ECES staff were questioned as to the application of this system to the Career Guidance of science students, several replies were forthcoming.

It was pointed out that the system should be particularly attractive to science students because it is itself based on a mathematical model--an answer reminiscent of a reply to the same question regarding OIAS, given by an Oregon respondent. The latter mentioned that science students in that state can gain "at least some experience with a modern information system" through exposure to OIAS. The ECES staff member expanded upon his own statement to include a similar thought.

ECES was described as of particular value to science majors because it gives excellent representation to occupations in science, mathematics and technology, a claim that can be verified by reference to the occupations included in the system. Further, the move now underway to add additional occupations that are prominent in Michigan will increase the occupations in technology that are retrievable because of the preeminance in that state of the auto industry as well as of other heavy manufacturing.

One respondent maintained that the work samples presented on microfiche are "brain ticklers of sorts that appeal to science-oriented students." He stated that "the system is programmatic; it goes along step-by-step, placing great emphasis upon logical thinking which is central to the scientific method."

One remark was that "although ECES was not designed to have a scientific bias, it has a great propensity to act this way"--meaning that there is no lack of exposure to occupations in science and technology for the user. This observation was abundantly verified in the writer's contact with ECES III. When, as a test of the system's proclivities, the neutral field of "administration" was selected as the primary interest (and the precaution was taken of claiming no great talent for mathematics when giving a self-estimate as to abilities in that discipline), the system nonetheless suggested a number of occupations in engineering and in the administration of science-related institutions that this user should explore.

ECES staff suggested that if the National Science Foundation wished to study the comparative attractiveness to students with a high potential for science of the various media that can be used to disseminate career information, research conducted at ECES schools with their multimedia approach should prove fruitful. Also, the ECES schools, used as sites for research that could be important to NSF, are in a position to serve as proving grounds for the development and testing of instructional modules and of exploratory work experiences designed to be particularly helpful to future science majors.

3. GIS - THE GUIDANCE INFORMATION SYSTEM

Background and Organization

The Guidance Information System (GIS) is a product of Time Share Corporation and the Houghton Mifflin Company. It is a computerized data retrieval system which provides information about occupations, two- and four-year colleges, and financial aid. GIS claims as its antecedent the Information System for Vocational Development (ISVD) developed at Harvard under the direction of Dr. David V. Tiedeman, a system that did not progress beyond the design and early prototype stage because of cost considerations.

In 1968 the Harvard group which had worked with Tiedeman formed Interactive Learning Systems, Inc. (ILS) for the purpose of developing a computer-based retrieval system for Career Guidance that would be technically and economically feasible. ILS was acquired in 1971 by Time Share Corporation of Hanover, New Hampshire. (15)

Since 1971, use of GIS has grown from twelve schools in the Northeast to 1,200 schools in thirty states by 1975. Company officials attribute this expansion to low delivery costs, the ability to run on any hardware, the technical services made available to users, and to the fact that it is an information retrieval system that does not attempt to be a "computerized counseling" system. Like Oregon's OIAS, GIS is expected to be directly involved in some of the states which have received NOIS grants from the Department of Labor, specifically in Ohio, Wisconsin and Alabama, and possibly in Minnesota and Michigan.

The Time Share Corporation markets its program on three different bases:

1. Terminal connection to Time Share's central computer and data bank located in Hanover, New Hampshire.
2. Rental of the software only (occupational and financial aid files) to be used on the school district's own hardware.
3. Sale of a complete package, consisting of a Hewlett-Packard computer and the information files (priced at approximately $30,000 at the time of this report).

Theoretical Substructure of the System

It is interesting to note that Tiedeman's ISVD, from which GIS claims descent, was an ambitious effort, fully based on developmental theory, to construct a highly sophisticated system which would foster individual decision-making capability. This proved to be a formidable task; funding support expired while the system was still in the development stage and before it became operational. While it was considered by many to be a most satisfying model theoretically, it never reached the point of being practically satisfactory. (16)

The present system bears few traces of Tiedeman's work. It is, and only professes to be, a computerized storage and retrieval system for career information. GIS is an instrument for counselor extension, rather than counseling simulation. It is therefore the product of a pragmatic rather than a theoretical approach, although it is in harmony with developmental theory by stimulating and assisting career exploration, but leaving decision-making to the student.

Means of Access

The GIS system offers the user direct access to the occupational and educational files. No tests, inventories, questionnaires or student information precede access. Detailed instructions are included in a fifty-one page printed Student Guide, sold by Time Share for one dollar per copy. After entering the system by logging in at the teleprinter terminal, the student is asked, "which file?".

If he wishes to explore the occupational file, he types "OCCU" and presses the return key, to which the computer responds "Occupational information ready". The student must then enter codes representing one or more characteristics about industries (the fifteen Office of Education occupational clusters) or one or more characteristics about occupations within industries (the nine occupational categories of the Dictionary of Occupational Titles). The computer then advises of the number of occupations which qualify, but does not print out specific information until the listing is reduced to twenty-five occupations. The user narrows his options by entering one or more codes representing personal characteristics (based upon the interest or aptitude components of the Worker Trait Arrangement of the D.O.T.) or educational characteristics (levels of formal education or training time usually required) until the number of occupations which qualify is twenty-five or less.

At this point, by typing the letter "P" the student gets a printout of the occupations on the list. He can then ask for further information about any of the occupations included and receive a brief job description, list of related occupations, and references to sources of further information. On request, itemized information is supplied, containing further detail about employment outlook,work activities, working conditions, physical demands, other qualifications, and earnings range, both entry and highest level. At any point in the process, it is possible to add or subtract occupations or their characteristics, or to limit itemized data to specific areas desired.

Much the same procedure applies for using the educational file. The student asks for either the four-year or two-year college file (COL 4 or COL 2) and narrows his options to twenty-five or fewer institutions by specifying certain characteristics, such as geographic location, major, subject field, size, cost, or admission requirements. The initial printout for each institution lists name, location, application deadline, and costs for tuition, fees and room and board.

The student can then explore an extensive array of variables about the characteristics of the institution, course offerings, admission requirements, academic standards, and programs and activities available. He can receive full or partial listing of all available information about each institution by use of code numbers contained in the Student Guide. He can modify the number of institutions on his list by adding or subtracting any of the characteristics in which he is more or less interested.

For both the occupational and educational files, it is also possible to have direct initial access to specific information about a single occupation or institution, by reference to a code number in the GIS Instruction Manual. However, this document costs twenty-five dollars and was not readily available to students at the sites where we observed the system in operation.

The occupational and educational files are independent and unrelated. It is not possible, while exploring an occupation, to learn what course of study provides preparation and which institutions offer it. The occupational file only identifies the level of education required. The responsibility falls on the student or his counselor to inspect the subject field listing in the educational file and to deduce, from a careful reading of the job description, which course or courses are applicable. While in many cases this relationship may be self-evident, there are others in which it is not so readily apparent. A case in point was our own exploration of the occupation Sanitarian (079.118), where it was not clear whether the appropriate course of study was environmental and sanitary engineering or public health.

The student receives an immediate printout of his entire interaction with the computer.

Occupational Information

Nearly 1,300 occupations are included in the occupational file. All of the information is national in character, supplied by Houghton-Mifflin Company and based largely upon the Occupational Outlook Handbook. Occupations are grouped both into the Office of Education fifteen occupational-industrial clusters and into the nine occupational categories of the Dictionary of Occupational Titles. Each occupational title is accompanied by a brief job description of fifty words or less, a list of related occupations, and a reference to additional sources of information such as trade and professional associations.

Occupations are also classified according to interest and aptitude characteristics as defined in the Worker Trait Arrangement of the D.O.T., Volume II, and according to the levels of education or training usually required.

Additional information is available about each occupation by code numbers which are referenced in the Student Guide. Subjects included are employment outlook (increasing, stable, or decreasing); work activities which are commonly associated with the occupation, based generally upon the temperaments components of the Worker Trait Arrangement; working conditions and physical demands; requirements for license, certification, examination or union membership; and the usual earnings range for both entry and highest levels of the occupation.

The occupation file is updated twice a year to incorporate modifications of national data as they become available.

Educational Information

The educational files contain extensive and detailed information on 1,610 four-year universities and colleges, and approximately 1,000 two-year institutions which offer academic or technical and occupational curricula. Course offerings are classified in twenty-three major academic programs of study; within these majors more than 380 subject fields are listed.

Institutions are classified by region and state, size of city in which located, enrollment, whether public or private, coeducational, or with religious affiliation. Information is also provided about admission requirements, scholastic standing, costs, financial aid, special programs, campus life and activities, and athletic programs. Each of these characteristics, as well as several others, is referenced to code numbers in the Student Guide, and the user can get a complete or partial printout of these items for each institution. He can also obtain a selection of colleges by combination of any of these characteristics that are important to him.

The four-year and two-year college files are the most comprehensive of any we have encountered in our review of computerized systems. Time Share Corporation attempts to keep all data current by questionnairing all institutions twice a year. Inevitably, of course, some entries are not completely up-to-date because not all colleges respond, or respond fully, each time around.

Another component is the Scholarship and Financial Aid Information file (SCHO). This is regarded as a prototype still being field-tested. According to Time Share Corporation it covers financial aid possibilities of more than $750 million. It classifies sources of aid by religious affiliation; racial or ethnic descent; student organization; and the parents' present or past employment, military service, and union or association membership. It also contains information about aid available for specific fields of study and examinations and competitions involved.

Student Information

Because no student record data is entered in the system, the user's right to privacy of personal information is not compromised by the GIS. In a few settings, the counselor reportedly requests a duplicate of the printout received by the student in order to be aware of the progress the student is making in career exploration and decision-making.

Hardware and Performance

At the sites where we observed GIS operations in Minnesota and Illinois, the GIS software package was leased and run on the computer installation belonging to a consortium of school districts. In both cases, Hewlett-Packard 2000's were in use. No problems of down-time or delayed response were reported. Most of the teletypewriter terminals operated at ten characters per second; a few had speeds of thirty characters per second. One teletypewriter we observed had a paper feed which slipped occasionally. This is a minor disfunction that can be easily corrected.

In addition to the Hewlett-Packard 2000 C/F, PDP-10 and PDP-11 hardware, GIS can run on other systems using FORTRAN IV or extended BASIC compilers and moving head disc storage,together with at least 32 K of core storage, such as Honeywell 200, 400, and 1640; Xerox Sigma series; and Data General Nova series. Time Share Corporation states that the GIS software will run on almost any hardware.

Relationship to Setting

Our site visits to GIS installations included two high schools in Minnesota and one in Illinois. In one the teletypewriter terminal was located in the Career Center where it was available for student use with or without assistance by the Center Coordinator. In another the terminal was in a counselor's office, and in the third it was located in a room which contained file cabinets of student records. In neither of the two latter locations was the terminal readily accessible to students unaccompanied by a counselor or teacher; in the last, such use was not permitted for reasons of file security.

It is likely that, in an effort to avoid counselor anxiety and resistance, counselor control over use of the terminal has been tacitly encouraged, and widespread unsupervised use by students has not been pushed. The information system seems to be generally regarded as one of several tools at the disposal of the counselor. Counselors make frequent use of the system themselves to extract information which they use in individual or group sessions with students.

In the two Minnesota schools no records were available about the number of students using the system. The only data reported was on minutes of use per month for each school in the consortium, reflecting use well below capacity for most of the terminals. At one high school we were informed that most students access the system for educational information. At the consortium headquarters, which maintains contact with all schools in the network, it is believed that the occupational file is used superficially by many students, the college files more intensively by a smaller number. It was also reported here that most counselors have positive attitudes toward the system, and that student use depends largely upon the degree of counselor endorsement.

There have been a few criticisms by counselors of the accuracy of GIS data, arising at times when, for example, national earnings are at odds with the wage rates prevailing locally, or when the counselor has personal knowledge about a course of study at a particular college that is not reflected in the data bank.

Records at the Illinois school indicated that from 225 to 250 students used GIS during each of the past three academic years. Over ninety percent of their use was for educational information purposes. Here again the volume of student use was not high, possibly because of relative inaccessibility of the terminal. Counselors unanimously support the system, particularly for college search, and also state that it is a valuable tool for stimulating students to start exploration and decision-making.

Transportability and Costs

GIS has the very great advantage that it can be used on most hardware installations andthat its cost is relatively low. The GIS software rental price is $9,000 for the first year and $8,100 for each succeeding year. Cost per school depends, of course, on the number of schools in the consortium. In the present Minnesota network, thirty-two computer ports are available to serve 140 junior and senior high schools. When Minnesota moves to a statewide educational computer consortium (now in process), the software rental price will rise to $15,000 per year, and the system will be available on 448 ports. At the Illinois site the consortium which includes seven high schools and one junior college is renting the files for $8,100 per year. To this must be added the one-time purchase cost of the teletypewriter terminal, ranging from $1,200 to $1,800. It was not possible to obtain a breakdown of computer time-sharing costs, as the computer installation is also utilized at both sites for many administrative functions and for computer-assisted instruction.

Evaluation

No formal evaluations of the system have been made at the sites we visited. Counselor reaction, mentioned earlier, is largely positive, particularly with respect to the educational information. Some have found that the occupational file criteria are confusing. At one high school attempts were made to questionnaire students about the usefulness of the system, but the returns were too few to afford a representative sample of the student population.

Conclusion

The strongest feature of GIS is the national scope and comprehensive nature of the information in its college files. This would appear to make it of particular value to students planning careers in science and technology, for whom post-secondary education is so important.

4. PHILADELPHIA'S VICS-THE VOCATIONAL INFORMATION THROUGH COMPUTER SYSTEMS

Introduction

Vocational Information through Computer Systems (VICS) is an interactive computerized Career Guidance information system developed by and utilized in the School District of Philadelphia. It has been in operation in the twenty-four high schools of that city since 1972, under the supervision of Dr. Sylvia Charp, Director of the Division of Instructional Systems and Gary Brookstein, VICS Project Coordinator. To obtain first-hand knowledge of VICS, we made a visit to the Instructional Computer Center, 5th and Luzerne Street, Philadelphia, in the summer of 1975.

Major Components of the System

The major component is the Occupational data base, which includes localized information about occupations and training resources. Also largely local is a College Search component, confined mainly to the surrounding region. A third component is the Job Search data base, for students planning to enter employment immediately. Finally, there is the Financial Aid and Scholarship Search (FASS) component which operates off-line; to use it, the student completes a questionnaire giving personal information and interests, and he is later mailed a printout about assistance for which he may be eligible.

Theoretical Substructure of the System

The designers state that they did not have a major concern with any particular theory of career development in the construction and operation of VICS. The approach appears to have been based entirely on the pragmatic and eclectic assumption that the provision of current and accurate Occupational Information will assist students to explore and to make more suitable career choices. Regardless of the lack of any claim to a theoretical undergirding, VICS does indeed assist in stimulating occupational awareness, exploration and decision-making, all of which are recognized in developmental theory as important aspects of the process of vocational maturation.

Means of Access

Access to the system is direct and simple. Utilizing an instruction booklet, the students enters some identifying information in the teletype terminal and then asks for information about any of the occupations which are listed alphabetically in the booklet. After receiving a brief job description, he can obtain specific answers to a series of questions about the occupation by typing in the number assigned to the question in the booklet. These questions are:

1. What are the educational requirements for this occupation?

2. What high school courses will help prepare me for this occupation?

3. What interests should I have to be satisfied in this occupation?
4. What personal qualities should I have to be satisfied in this occupation?
5. What physical qualities should I have to qualify for this occupation?
6. Where do people in this occupation work?
7. Where in Philadelphia can I be employed in this occupation?
8. What is the current Philadelphia pay for this occupation?
9. What are the benefits, working conditions, advantages, and disadvantages of this occupation?
10. What chances are there for advancement?
11. What is the future outlook for this occupation?
12. What schools in the Philadelphia area will prepare me to enter this occupation, and how much do they cost?
13. What scholarship and financial aid, if any, is available?
14. Where can I get information about schools outside of the Philadelphia area?
15. Where can I get additional information about the occupation?

If the student is uncertain as to the occupations about which he desires information, he may choose a form of structured access where he is presented with a list of interest areas (an adaptation of Anne Roe's classification system) and educational levels. The eight interest areas are:

1. Service
2. Business or selling
3. White collar work
4. Engineering, trade, technical and mechanical
5. Outdoor
6. Science
7. Cultural
8. Arts and entertainment

The six educational levels range from no special training after high school to post-graduate preparation. By entering on the terminal an interest area and the level of education he expects to complete, the user obtains a printout listing the occupations which meet these criteria. He may then ask any of the specific questions listed above about an occupation, as in the direct access method, and obtain the requested information. This access route via interest areas and educational levels is similar to the secondary level program of CVIS, an earlier development which is described further on in this chapter.

Occupational Information

The occupational data bank contains information on more than 400 occupations, geared specifically to the Philadelphia labor market. The Job Search file contains data on 6,000 local employers, from which the user can obtain a listing, either city-wide or for his own neighborhood, of the establishments that hire entry workers in a particular occupation. A staff of two full-time professionals and four college student assistants is responsible for the annual updating of these data and for the extension of occupational coverage. The principal method of collecting this information is by mail questionnaires to local employers, staggered through the year. An annual update of all information is standard practice. Current budget stringencies, however, threaten the updating and possibly the continuation of the Job Search component.

We were told that the Pennsylvania Department of Employment Security cooperates in the provision of occupational labor market information.

Educational Information

Education and training facilities data cover only those schools and organizations located in Philadelphia, in the rest of Pennsylvania, and in New Jersey and Delaware. This information includes four-year and two-year colleges, trade and technical schools, apprenticeships and on-the-job training. VICS' staff is now attempting to include some colleges outside the region.

Student Information

No student data or test results are entered into the system. We were advised that serious community objection would arise from any compromising of personal privacy or restriction of access based upon personal data.

Hardware and Performance

The system uses Hewlett-Packard 2000 and 3000 computers which serve both the VICS system and an extensive program of computer-assisted instruction. There are 28 teletype terminals dedicated to VICS, located in twenty-four high schools and three public libraries. No problems of downtime or delayed response were reported.

Relationship to Setting

A teletype terminal in each of the high schools is usually located in or adjacent to the counseling department offices. Other terminals principally used for computer-assisted instruction may be used for access to VICS when not otherwise occupied. Unaccompanied use by students is permitted and encouraged. The student must make an appointment for a forty-minute session at the terminal. Records show that forty-five percent of those seeking appointments obtain them for the same day; an additional twenty-three percent are assigned time within two days.

Statistical reports indicate that in the 1974-75 academic year more than 10,000 high school students used VICS on the average of twice per year. According to the staff, nearly 50 percent of 11th and 12th graders make some use of the system. Approximately three-quarters of all inquiries are via the direct access route, requesting information about a particular occupation. The most frequently asked questions, and in this order, are about the educational requirements of the occupation, the current Philadelphia pay scale, schools where preparation is offered, applicable high school courses, and the employment outlook. Fifteen percent of all contacts were for Job Search Information, and 11 percent were for information about training and financial aid.

Use of VICS is encouraged by counselors. It appears to tie in well with the counseling program, for well over half of the students using VICS discuss their explorations with the counselor.

Costs

VICS staff were unable to give us any information about the costs of the system. Because it operates as a minor part of the total computer-assisted instructional program, it is difficult to isolate data for this component. The major charges which can be directly attributed to VICS are the staff costs connected with the development and maintenance of the data base. Inevitably, a system that develops its own localized data base will have greater expenses in this respect than a system that uses only national data that are available to the public.

Evaluation

After each use the computer asks the student to respond, if he wishes, to several questions about the program. A total of 4,364 questionnaires were tabulated in the 1974-75 school year. The responses, which in our opinion can be construed as a favorable rating of VICS by the students, are summarized below:

1. Did you learn about any occupations that you did not know existed until today?

A. No	49.0%
B. Yes, one or two	31.7%
C. Yes, more than two	19.3%

2. Were the instructions easy to follow?

A. Yes	93.7%
B. No	6.3%

3. Was the occupational information hard to read?

A. Yes	15.5%
B. No	84.5%

4. From which of the following would you prefer to get occupational information?

A. The computer	79.9%
B. Books and other reading materials	3.1%
C. Counselors	9.3%
D. Teachers	2.0%
E. Other sources	5.7%

5. Do you think this information will help you in planning a career?

A. Yes	76.9%
B. No	3.0%
C. Not sure	20.1%

6. Are you going to discuss your future plans with your counselor?

A. No	11.8%
B. Only if I am asked about them	31.9%
C. Certainly	56.3%

7. Are there any occupations that you wanted to learn about that were not on the computer?

A.	No	79.5%
B.	Yes, one or two	17.3%
C.	Yes, three or more	3.2%

Conclusion

The VICS system is occupationally oriented, with post-secondary educational information brought in as it relates to preparation for an occupation. It would therefore appear to be of significant value in the Career Education model. The emphasis on current and accurate localized information is a definite advantage of VICS. For students planning careers in the higher levels of science and technology, a college data base with more extensive detail and geographic scope would be helpful.

5. ETS' SYSTEM OF INTERACTIVE GUIDANCE AND INFORMATION

Introduction

"SIGI", its developer, Dr. Martin R. Katz, has written,

> *"is not a nickname for someone's warm Viennese uncle. It is a computerized System of Interactive Guidance and Information being developed at Educational Testing Service, under a grant from Carnegie Corporation...We expect that SIGI, although not avuncular will be able to respond flexibly to the individuality of each student."* (17)

Detailed statistical analysis of computer print-outs describing the behavior of students interacting with SIGI testify to this individuality. They show that so marked is the variability in the way it is utilized that it is difficult to identify any particular behavior of students in its use as "typical". In a study of the first field test of SIGI, the developers write of the students:

> *"they seem to appear, each with individual preconceptions and needs, and then formulate a method of attack based on their status and on the resources of SIGI. This behavior is consistent with the underlying philosophy of SIGI: to enhance each student's freedom and competence in career decision-making as he gains mastery of the machine."* (18)

And further:

> *"By design, SIGI is open to much variability in the way it is used. There are two main ways in which the student can interact in a highly personal manner: first, in the amount of use he makes of any system once he has entered it, and second, in the path he chooses in going from system to system as he collects information as an initiate. Students have apparently taken advantage of both opportunities to be distinctive."* (19)

Earlier, we characterized OIAS as "the Labor Market Analyst's system" with its strong emphasis upon the accuracy, timeliness and localization of its employment data; ECES we named "the Career Educator's system" because of its close relationship to work tasks and values and its integration within the context of a work-oriented guidance program. SIGI, we believe, should be considered "the Guidance Counselor's system"--with the counselor aiming, not so much to insure the student's "right choice" as helping him to master strategies for rational behavior in the face of uncertainty.

One of our respondents (in no way connected with the system) maintained that its outward manifestations of urbanity and painstaking good craftsmanship deserved equal recognition with its "underlying philosophy." He spoke of SIGI, as the "Cadillac of Systems".

Background and Organization

SIGI has been developed at the Educational Testing Service headquarters in Princeton, New Jersey, under the direction of Martin P. Katz. Financial support for its development has come primarily from a five-year grant from the Carnegie Corporation, with an additional grant from the National Science Foundation.

At the time we observed the prototype model of SIGI, it was being field-tested at Mercer County Community College in New Jersey. Shortly it was to be installed, with formal evaluations of its performance in the 1975-1976 school year, in five additional schools located in California, Florida, Illinois, Michigan and Texas.

SIGI was designed primarily for community colleges, the fastest growing segment of American education, because its developers believed these schools to combine great need and probable readiness for computerized guidance. However, SIGI is readily adaptable to other settings and populations. Thus, despite this study's primary orientation to secondary education, it appeared appropriate to include this system in the group of computerized systems described.

Major Components of the System

Stored in the computer are sequences of frames of scripts that articulate the model of Career decision-making upon which SIGI is based. The full model consists of six major subsystems. These are: VALUES, LOCATE, COMPARE, PREDICTION, PLANNING and STRATEGY.

1. Values is at the heart of the system because making an occupational decision most often requires choosing between competing values. Thus, it is regarded as critical that students examine and become aware of their own values and explore the roles of these values in decision-making. The student enters the system by way of identifying and scrutinizing his values and, as with the other subsystems he is repeatedly confronted with previous decisions respecting his values and given opportunities for their reappraisal.

   His facility for handling value estimates is sharpened by way of playing a delightful game (with the help of the "Strive Employment Agency") in which the student meets a series of value dilemmas regarding choices to be made between such imaginary occupations as "Torpist" and "Varisator." Sobered by learning in this encounter where his possibly confused or inconsistent thinking can lead, he is then challenged to assign new weights to his values. Thereupon a constraint is introduced by means of assigning a fixed sum that is to be distributed among ten values, an exercise that is intended to convince him that "one can rarely expect to get all of everything in the real world." After making a required series of adjustments, the student, armed with a profile of his "examined values" is ready to proceed to the next subsystem.

2. Locate is the subsystem that converts the students' examined values into a list of specifications for searching stored occupational data through

which to retrieve a list of jobs meeting or exceeding his requirements as to values. The student is now ready to ask questions about the occupations suggested to him by Locate, or he may, if he wishes, choose others from the entire list of those which are in SIGI at any given time.

3. Compare returns information about three occupations at a time to the student. This information is displayed not in the format of a job description but as replies to any number of questions he may care to ask about the occupations on his list. Taken together, the answers to all of the questions he could ask about an occupation would furnish a complete description of the job together with its requirements for entry.

4. Prediction is the subsystem designed to assist the student in judging his chances of success in the various programs offered by his local community college. It must be emphasized that this subsystem is descriptive rather than prescriptive. It also contains an excellent component that might be considered "programmed instruction in probability."

   Predictions are in the form of experience tables that show the user the percentage of all students entering his local community college with test scores and previous grades like his who received grades of A, B, C, or less than C in each curriculum or key course. These tables are derived from local data, involving the best combination of available predictors such as high school rank and scores on selected tests. The best combination of predictors--which may include the student's own informed estimates of grades in courses--is stored as a regression equation from which each student's predictions are computed on-line. The prediction appears in a frame that advises the student in relation to each key course in a program in which he has expressed an interest, and what may be his chances (out of one hundred) of obtaining A+ to B-; C+ to C-; or below C-.

5. Planning is the next exercise encountered by the student. In this subsystem, he is assisted in planning the steps that would be needed in order to implement his career choice were he to follow through on the occupation he was considering or had tentatively selected. If that occupation were in the professions, he would first need to decide as to his willingness and ability to undertake the required amount of education. Depending upon the type of occupation selected, he might be shown various alternative programs and means of preparing for the occupation. He would be given predictions informing him of the probability of passing certain key courses in his major field, and offered opportunities to drop the occupation under scrutiny and start over again with another. Finally, he would be helped in selecting the program at his local community college that would enable him to begin the journey towards his tentative career choice.

6. Strategy brings together previous inputs to the system--the student's values and information respecting the opportunity each of the occupations under consideration offers to provide the rewards and satisfactions represented by these values. He is then shown the desirability of each choice as modulated by his probability of success in entering the occupation.

   The student also receives a sort of programmed instruction in the matter of risk-taking so that he may examine his choices in the light of relative risks and rewards. As an example, if the occupation with the highest desirability (in that it most closely accords with his values) does not carry the highest probability of success as well, he must decide if the higher reward is worth the extra risk. It is the objective of this subsystem that in working his way through such problems the student is schooled in rational decision-making through the evaluation of choices and an exploration of alternative strategies for choice.

Theoretical Substructure of the System

The developers of SIGI have so cogently expressed the thinking upon which this system rests that it can best be described in their own words. The somewhat lengthy exposition of this thinking which follows will also assist the reader in comparing SIGI with the preceding systems outlined in this chapter.

> *"It should be emphasized, first, that the ethic of this system is humanistic rather than mechanistic. There has long prevailed a stereotype associating computers with dehumanizing control. Indeed, as far back as 1928, Clark Hull (in his book Aptitude Testing), gazing prophetically into a brave new world of psychometrics and computers, proposed that a single universal battery of thirty or forty aptitude tests be given to eighth graders. Scores would be fed into a machine that would already contain forecasting formulas for major occupations. The student would then choose one of the three or four occupations in which his chances of success are greatest.*
>
> *"Developments in measurement, data processing, and statistical techniques over the intervening decades created a rush of excitement about the possibilities for translating Hull's dream into a reality. But the vast technological gains appeared to invoke a law of diminishing returns. Neither Hull nor his successors anticipated the stubbornness with which the data (reflecting the multipotentiality of individuals) would resist neatly differentiated forecasting formulas.*
>
> *"Faith in the prospects of the trait-factor model have persisted. The main objections to this model, however, lie not in its inaccuracies but in its premises. It assumes that the prediction of occupational membership and success is the main--virtually the sole-business of guidance. It starts with the explicit hypothesis that occupational*

> *sorting does tend to take place in a certain way--through trait-matching. It proceeds on the less clearly explicit conviction that occupational sorting should take place in this way--only more so. Trait and factor theory seems to hold that the individual is in effect "keyed" to one or a few "correct" occupations, that the key should be recognized early in adolescence, and that all subsidiary decisions--as of education--should be fitted to it. Application of this theory would presumably result in a more exact homogeneity of membership in each occupation. It would also tend to reduce the student's role in decision-making to one of passivity.*
>
> *"This is essentially a 'manpower' model rather than a guidance model. The manpower model is an attempt to follow some general optimization rule for matching people to jobs....*
>
> *"The evidence that individuals are multipotential and occupational requirements are flexible is damaging for the manpower model. But it supports a guidance model which maximizes individual freedom of choice. A guidance model hinges on satisfaction of individual values, with manpower needs helping to determine the opportunities and means for gaining such satisfactions."* (20)

As to the freedom of the individual in his decision-making, that freedom is defined by the developers.

> *"Freedom involves active participation and control. It also incorporates the notion of career decision-making as a continuous process rather than a "one-shot" episode. This sense of continuity encourages people to formulate their plans as theories to be tested and to revise or confirm their decisions in the light of the feedback they get from outcomes. This approval allows them to learn from experience...*
>
> *"Therefore, we bend our efforts to increase the student's understanding of the factors involved in choice (imperfect though our own understanding may be) so that he can take responsibility for his own decision-making, examine himself and explore his options in a systematic and comprehensive way, take purposeful action in testing hypotheses about himself in various situations and exercise flexibility in devising alternate plans.*
>
> *"The student's interaction with the computer embodies this model of guidance. As the student learns to control the computer and move freely through the system, he is also developing competencies for independent decision-making. The computer does not just give him an 'answer' to a question; it also suggests questions for which he can provide answers. Thus in his dialogue with the computer, the student both receives and generates information, and learns how to connect the two kinds of information. Throughout, his role is active. He can change his inputs as he recycles through parts or all of the system to see what effect new premises may have on the outputs."* (21)

Means of Access

The above lengthy quotation gives the underlying philosophy of SIGI with its emphasis on freedom and freedom of choice, for the system developers define the "best" choice as "the choice that is more nearly free." (22) It also presents a strong case for maximizing the interactiveness of computerized Career Guidance Systems because of the instructional capability of this mode.

However, the matter of access remains. There must be some principle for choosing within the sytem. Otherwise the user is left to select at random what he wishes to explore. Or he can express an interest that has not been scrutinized as to its origins or tested against the real world. Or he is consigned to the trait-factor approach.

The developers of SIGI are adamant on what they frequently express as the "primacy of values." They maintain that the individual must choose between competing values in order to escape being swayed by blind impulse. He must remain open and receptive to different values, and must actively and systematically explore competing values so that he can answer the central question, "what do I want?".

Thus the route of access to the information stored in SIGI is through an exploration of the user's values together with decision-making concerning them. The first-time user of SIGI must follow this structured approach initially. After his exploration of values he may call up information as he wishes; his access to the system is then unstructured.

Values are defined for the student in operational terms. That is, the value of "High Income" is presented as a range of median incomes. "Independence" is defined in specific amounts of job supervision. "Leisure" is reduced to a scale of time off the job.

This degree of specificity is required, for the values as defined become the screening device whereby jobs are retained for the student's subsequent exploration or dropped from the list he will be provided. It is precisely this feature that has generated the strongest criticism of SIGI.

While a match can be effected between some of the values as defined by SIGI and occupations as they exist in the labor market, the empirical evidence for relating occupations to certain values such as "Prestige" or "Independence" must remain notably slim. The broad variety of situations characterizing different jobs within the same occupation (depending,as examples, on the industry in which the occupation is found, the job's geographic location, and certainly on the individual employer) all make generalizing of this sort extremely hazardous. Also, the cause and effect relationship between personal values and the opportunity offered by various occupations to bring a satisfaction of these values is largely unexplored.

However, the fact that, after values have been investigated, an opportunity is offered to gain free access to all the information that is stored in the system does ensure that the total range of occupations in SIGI may ultimately be accessed freely. Thus no harm should come from initially going this route, provided the student does not infer from the exercise that he will necessarily experience greater satisfaction in the occupations presented to him than he would in others. This hazard, it ought to be noted, should be no greater than that of a student's believing that he is somehow best suited for a certain occupation after experiencing a computer session that is more straight-forwardly derived from the worker-trait approach.

Occupational Information

After the student's selection and weighting of values has generated a list of occupations, he obtains his information about them from the subsystem, *Compare*. This is done by his indicating to the computer which of the job elements the student has been invited to search he now wishes to have answered on the CRT. The questions he can ask cover the usual gamut of subject matter included in an *Occupational Guide*--job definition and description; education, training and other requirements; income; personal satisfactions; conditions of work and employment outlook.

Information stored in the computer for answering these questions is gathered from several sources, interpreted, reconstructed in format, documented by SIGI staff members, and finally reviewed by specialists in the respective occupations. It is subject to continual review, with changes entered into the computer periodically.

National rather than local data are presently used in the system. All national data, however, are checked against representative regional and local information, and efforts are made to incorporate regional data when significant differences are noted between national and local materials.

As mentioned above, the classification system for occupations is based upon their "score" when rated on the ten values that have been defined for the student. The rating given indicates the degree to which each occupation is believed to satisfy a given value and, as such, this rating governs the occupations admitted to the student's list of jobs and those rejected by the computer for a given student.

Educational Information

SIGI's computer stores extensive information about the two-year college housing it. The student can obtain an overview of a complete plan for entering the occupation in which he is interested followed by the semester-by-semester course of studies recommended for study at his own college.

But because many students require transfers to other institutions at the end of the second year, the system is also designed to provide information about colleges in the region that offer a major appropriate for the occupation they are considering. Extensive information about sources of financial aid is also available.

Unlike some systems, SIGI, with its orientation to the community college, does not attempt to present the student with a nation-wide list of four year colleges.

The institutions that are selected as follow-on colleges for the user are displayed because they offer the appropriate curriculum for a given occupation and are near the college housing SIGI. If no nearby colleges offer the curriculum, it is then necessary to go farther afield in order to find a school that does. Information about the courses offered and the characteristics of this school is then presented to the student as it also would be for nearby schools when they are displayed for his consideration.

Student Information

The subsystem Prediction contains the high school rank of the student who uses SIGI early in his college career and, possibly, certain test results; such student information as is stored depends upon the school which elects to use the system. Later on, the student's college grade point average will also be stored in the computer because this score is regarded as the best predictor of his future GPA.

The confidentiality of student data is protected. Only the student knows his identification number, plus the person monitoring the system. In any event, another individual entering the system could obtain very little of the interaction that has taken place; most of it (except during tests conducted for research purposes) is destroyed at the close of the session when the stu-calls for print-outs of what he has learned in this subsystem--a privilege he has in the other subsystems as well.

Hardware and Performance

SIGI was designed to operate either as a stand-alone service on an on-site processor, or as a remote service with a single processor serving a number of schools via leased lines. The prototype on-site SIGI configuration consisted of a Digital Equipment Corporation PDP-11/20 processor with 28k of core memory, an RF-11 fixed-head disc with 512 words of storage, and other equipment needed to operate the two terminals--one in the computer room and one at Mercer College.

The program is written in BASIC-PLUS, an extension of Dartmouth BASIC, designed for use on Digital Equipment Corporation's PDP-11 family of Computers under the RSTS/E time-sharing monitor. Multiple SIGI terminals can be supported on a small RSTS/E configuration build around the PDP-11/40 processor having removable mass storage. With additional core storage and mass storage the time-sharing system can support concurrent operation of other standard terminals up to a maximum of seventeen. Configurations built around larger processors such as the PDP-11/45 can support up to thirty-two terminals simultaneously.

The terminal by means of which SIGI interacts with the user is a high-capacity cathode-ray tube display and keyboard with an associated low-speed printer. Terminals may be located near the processor or they may be operated over telecommunication links at remote sites.

Relationship of System to its Setting

Because SIGI was in its developmental phase at Mercer College during our site visit, the way it will be fitted into the general counseling program of a school or its reception by students and others has to be derived from the intentions and plans of its developers rather than from actual and extensive experience with the system.

According to its developers, these intentions and plans are as follows:

> *"SIGI is planned to fit into the regular guidance programs at the colleges. It will not supplant counselors. Rather, it will complement the work of the guidance staff.*
>
> *"SIGI does superbly some things that human counselors cannot do efficiently, or at all. It stores, retrieves instantly, and manipulates vast amounts of information, putting great resources at the fingertips of each student, tailored to his of her individual needs. It brings together many sets of variables--personal, occupational and institutional. By combining these sets of variables in distinctive ways for each student, it constructs new and unique information...*
>
> *"On the other hand, SIGI does not attempt to do what many counselors do superbly. It does not provide a warm, human relationship; it does not try to solve personal, social, or academic problems; it does not attempt to cope with emotional upsets."* (23)

There are, however, many ways in which the counselor's work can be articulated very closely with SIGI. The system staff has prepared what in their words is a "monumental handbook", giving many suggestions as to how the counselor may capitalize on the student's experience with the system. Information gained in field testing thus far indicates that the counselors like SIGI as do the students, but the developer stated, "SIGI was installed at a school where they wanted it." Further information is to be collected regarding the attitudes of counselors and students from the five additional sites at which SIGI will shortly be operative. These installations, too, will be preceded by careful in-service training as SIGI staff are alert to the anxieties of counselors regarding their displacement by computerized systems.

SIGI was believed by its developers to have the potential of "fitting in well with a vigorous Career Education thrust." It was mentioned that from now on, as additional occupations are selected for inclusion in the system (probably at the behest of the new user schools), the connection between SIGI and Career Education should grow appreciably.

Transportability

The fact that the school year 1975-76 will see the installation of SIGI at five additional sites spread across the country speaks to the feasibility of its use at a variety of locations and in various environments.

One member of the SIGI staff believed it better that the user school should have a PDP-11 or PDP-11/20. This equipment in his view establishes a better relationship between terminals and the Central Processing Unit in that it lessens telecommunication costs. Also, he believed it cheaper to obtain PDP equipment than to institute a "nightmare of reprogramming."

Costs

The cost of SIGI as of other systems is necessarily a function of the number of terminals in use and of the number of hours it is used.

A standard four terminal system with print-out was said to cost about $80,000 in capital expenditure. In addition, there is a lease fee to cover costs of installation and costs of data base maintenance and training of users. As these costs will vary considerably on a per-user basis depending upon a school's enrollment, it is readily apparent that forming a consortium of users would cut costs substantially.

One authority, writing in 1973, has estimated operating costs for a four-terminal on-site system at $5.00 per terminal hour, provided that each terminal is used for at least 1,200 hours per year. (24)

Evaluation

The formal evaluation of SIGI is to take place during the 1975/76 academic year. There is, however, some material available describing the "earlier 1973 SIGI." (25)

Evaluative material respecting SIGI brought to the attention of the writer differs appreciably from that reviewed for other systems. The material covers only a small sample of student users but it reflects intensive and careful study, and centers upon every detail of the student's behavior while using the system rather than upon his attitudes regarding it. Tracking data derived from computer use supplies a source of detailed records describing each student/computer interaction and reveals not only how much each component of each subsystem is used but also how it is used.

According to the developers, student and counselor attitudes regarding system use will be explored and documented in the forthcoming formal evaluation.

Conclusion

SIGI as compared with most of the other systems reviewed in this chapter is one meeting the theorists' prescription that a computerized Career Guidance system should be based upon a body of coherent and sophisticated career development theory--that it should be more than "just an information system." In meeting this challenge, SIGI is, of course, open to criticism from those who disagree with the particulars of its theoretical underpinnings, notably the primacy it gives to values.

When we asked if SIGI might have a particular application for the science major, several of its characteristics were cited as especially appropriate for this type of student. It was mentioned that at no point does SIGI "talk down" to the student in any of the script. A further relevant characteristic is the high proportion of all occupations in the system that are based in science, mathematics and technology. The information given on science occupations is completely "non-threatening." It contains no sex or minority group bias. Further, the approach used for teaching decision-making and other subjects employs the scientific method in its reliance upon hypothesizing, feedback, confrontation with dilemmas and tests of these hypotheses against reality. In addition, both the prediction and the strategy sections rest upon very complicated models that introduce elements from economics, sociology, and advanced decision-making theory. It can, in fact, be said that the entire system is a form of "science education in that it induces the user to think rationally."

One user can assuredly testify to the fact that the student will be liberally exposed to occupations in science and technology even if he, at no time, confides to the computer any special interest in these fields!

6. CVIS-THE COMPUTERIZED VOCATIONAL INFORMATION SYSTEM

Introduction

The Computerized Vocational Information System (CVIS) is a computer-based career guidance information system utilizing cathode ray tube terminals for delivery. It is the oldest of the interactive computer-assisted guidance systems now in operation, having been developed at Willowbrook High School in Villa Park, Illinois in 1967. It is now in the public domain and its use has been expanding. In 1975 there were fifty subscribing members and the system has been installed in approximately 225 schools throughout the United States. In May 1975 we attended a meeting of the CVIS Consortium and were able to obtain dissemination materials (26), observe a demonstration of the system, and to discuss various aspects of the system with its developers and users.

Background and Organization

CVIS was developed by JoAnn Harris Bowlsbey and her associates at Willowbrook High School, Villa Park, Illinois, with major funding support from the Illinois Board of Vocational Education beginning in 1967. The major and still most important purpose of CVIS is the application of computer technology to Career Guidance information functions. However, in order to make the system cost-feasible and more attractive to administrators, other components for administrative functions and computer-assisted instruction have been added.

In 1972 the CVIS Consortium was established to provide a vehicle for the exchange of information, experience and locally developed scripts. Until June 1975 the CVIS Project staff at Willowbrook High School furnished other schools with software and documentation; this responsibility has now been taken over by the Consortium. All materials relating to the system including software packages are disseminated by a distribution center at Western Maryland College.

Major Components of the System

There are three major parts to the CVIS system: a student guidance system; a counselor/administrative system for student records, which includes test results and grades, attendance reporting and scheduling; and a computer-assisted instruction capability. Our review is restricted to the first part.

Within the Career Guidance component there are ten programs:

1. Career Exploration-Junior High Level--relates student grades, test results, by quartile, and answers on a multiple-choice questionnaire, to Holland's work environment classification (realistic, social, enterprising, investigative, artistic, and conventional). The computer shows the student, via the display screen, how his characteristics compare with the ideal characteristics of workers in these classifications.

2. Career Exploration-Secondary Level--assists the student to explore approximately 400 occupations classified by Anne Roe's eight interest areas and by six levels of training after high school, ranging from none to advanced degrees.

3. Four-year Colleges--provides general information on college planning and detailed information on four-year colleges and universities throughout the United States.

4. Community Colleges--a script about the College of DuPage. This may be used as a model for users in other areas to develop localized scripts for their community colleges.

5. Technical-Specialized Schools--general information and a format for the preparation of localized scripts.

6. Apprenticeships--general information on apprenticeship opportunities by means of an on-line quiz. Specific information has to be locally collected.

7. Local Jobs--general information about job seeking. It needs to be supplemented by data from local employers and entry positions.

8. Military Program--information about Selective Service requirements, voluntary enlistment, and service training and career opportunities.

9. Financial Aids Search--based upon the student's response to fifteen questions and his class ranking and test scores, information is provided on financial aid which may be available to him. The data file contains national scholarships and aid programs which may be supplemented by local information.

10. Select-a-Course--assists the student in reviewing his progress toward graduation and in self-registering for courses. It must be adapted for each school setting.

Theoretical Substructure of the System

According to its designers, CVIS is based on developmental theory. It seeks to stimulate self-awareness, career awareness, exploration and decision-making. It is not designed to replace counselors, but to assist the student and counselor in the information collecting and sorting stage which precedes career decision-making. It relies, in the secondary school component, on Anne Roe's theoretical work in areas of occupational interests; and on John Holland's theories of personality types and work environments for the junior high school level program.

Means of Access

To use the junior high level career exploration program, the student types in his responses to a thirty-item multiple-choice questionnaire that appears on the display screen of the terminal. Information from the student's record, which has been entered into the computer, is used to confirm or alter the student's self-rating of ability and school achievement. The computer then suggests Holland clusters of occupational areas in order of priority, and refers the user to visual materials which illustrate the kinds of interests and abilities related to the work environments.

The next phase presents the "ideal" characteristics of workers in each of the six work environments, with which the student can compare his own characteristics. After referral again to off-line visual materials about adult occupations, the student is asked to select those which appeal to him. He is then presented with information about the amount of training needed and the high school courses appropriate to the occupations.

In the secondary level career exploration program, the student is asked by the computer to assess his ability as measured by tests and his class ranking. The computer checks his entries for congruency with the student's record on file, and a "conversation" ensues which confirms or corrects the student's self-rating.

The student is then asked to choose one of six levels of training he plans to pursue:

1. No further training after high school
2. Some on-the-job training (2-6 months)
3. Trade school or apprenticeship
4. Junior college or technical school
5. Four years of college
6. Advanced degrees after college

The level selected is again compared with information in the student record file and he is advised whether his plan is consistent with his abilities, or whether there are minor or major descrepancies which should be discussed with his counselor.

Next, the user is asked to choose one of Roe's eight categories of occupations for exploration:

1. Service
2. Business Contact
3. Organization
4. Technology
5. Outdoor
6. Science

7. General Cultural

8. Arts and Entertainment

The computer may check this selection against the student's Kuder interest inventory, if the results are on file, or go directly to the presentation of occupational information. The display screen shows a list of occupations which meet the interest and training level indicated by the student. He can obtain further information about any or all of these, including a hard copy.

When he enters the program on subsequent occasions the student bypasses the earlier steps and goes directly to the occupational listing. The program allows him to alter his interest and training level choices and to explore as many occupations as he desires.

In accessing the college files, the student can obtain answers to questions of a general nature related to college planning, or he can go directly into the college search by entering any or all of seven characteristics that are used to classify colleges. He receives a listing of the institutions that meet his criteria; and, on request, more detailed information about any of them, including a printout.

Occupational Information

The CVIS occupational file covers more than 400 occupations, classified by interest areas and training levels. Information about each occupation is presented in two forms: a thirty to fifty word definition, shown on the display screen; or a 300-word occupational brief in hard copy via the printer, explaining job duties, requirements for entry, employment outlook, salary range, and references to additional information.

The occupational file is purchased from the Ferguson Company and is updated every two years. It comprises only national data; localized information must be developed by the school district.

Educational Information

The four-year college file is prepared for CVIS by ACT and is updated yearly. It lists 1,667 colleges and universities throughout the U.S. and classifies them by seven characteristics:

1. Majors (27 areas of study)
2. Size of enrollment
3. Community size
4. Control
5. Costs
6. Location
7. Admission standards

At the present time CVIS users must collect their own information on community colleges. Some consideration is being given to obtaining a national file.

Student Information

CVIS is designed to include student record data, grades and test results in the data bank, and to consider this information in the interaction with students about their choices. A confidential identification number provides some safeguards of privacy. It is possible for counselors to monitor student use of the system.

Hardware, Transportability and Performance

CVIS was originally programmed for IBM 360 and 370 equipment and is available in BTAM, CICS, SWIFT and COURSEWRITER for use with the IBM 2260 or Bunker-Ramo CRT's. There is also a revised BTAM version for use with the IBM 3270 terminal. Members of the consortium are using versions programmed for Honeywell, Univac, PDP-11 and Burroughs hardware. The CVIS Consortium is reviewing the documentation for these programs to insure that standards are met before giving them official approval. It is apparent that reprogramming to other types of hardware involves a major effort.

Relationship to Setting

There is considerable variation between school systems in the way they operate CVIS. Some are using only the guidance information component without the administrative and computer-assisted instruction programs. Others have not entered student data into the system. Only the national occupational data files and the four-year college files are common to all, supplemented in some locations with local occupational labor market information, community college and technical school listings, and Job Search Information.

Costs

An initial charge of $900 to $1,000 is made for a one year membership in the CVIS Consortium, the original program documentation, and the occupational and college files. The charge varies slightly according to the number of subsystem programs desired. Continuing costs are a $250 annual membership fee, a $200 charge for the annual update on the college file, and a $300 charge for the update of the occupational file, which occurs every two years.

Other costs vary directly with the number of sites, the number of terminals, and the length of lease lines. At Willowbrook the costs were $18,000 per year, covering six terminals, two printers, seven miles of telephone lines, and staff costs for a half-time paraprofessional. It was estimated that this came to $1.92 per student contact hour. (27) In Rhode Island with twenty-eight sites, the annual charges for one terminal and one printer at each site is $3,800 to $5,000, depending on the length of the telephone line.

There are added staff costs, of course, for any institution that desires to collect localized information about community colleges, technical schools, apprenticeships, employers and occupations.

Evaluation

From questionnaire data and interviews with students using CVIS, Harris (28) reports that students typically feel they:

(a) have gained an increased awareness of the world of work;

(b) have received a large amount of information about vocational and educational alternatives;

(c) have expanded the number of vocational options;

(d) have a greater ability to make vocational decisions;

(e) prefer computer exploration of occupational information to the traditional exploration of books and filing cabinets;

(f) can more clearly relate abilities and interests to occupational choices; and

(g) have gained in specific knowledge about specific occupations.

Harris (29) also reports on a study of the effects of CVIS use on the vocational maturity of 130 tenth graders at Willowbrook High School. Using the Career Development Inventory as a measure, she found a significant increase in awareness of the need to plan and in knowledge and use of resources for planning. However, no improvement showed up in decision-making skills.

Conclusion

The developers of CVIS deserve credit for producing the first interactive, direct inquiry, computer-based guidance information system to become fully operational. The range of its subsystems meets most of the information needs of Career Guidance, and offers the additional benefit of relieving counselors of many routine tasks. The spread of the system in the past few years from the original Willowbrook site to 225 sites testifies to its practicality, flexibility, and cost-feasibility. CVIS appears to offer valuable assistance to Career Education and in the guidance of science students.

CVIS still faces two obstacles to making its usefulness more universal: developing localized occupational and training information and integrating this information into its data base; and increasing the system's transportability by programming for other hardware configurations.

7. PROJECT DISCOVER

Introduction

> *"Because of the success of the CVIS system, the Illinois DVTE contracted with Willowbrook High School for the conceptualization of a new, more comprehensive and more advanced system, now called DISCOVER. There were several reasons for studying the feasibility of a new product: a) the life of a computer program is generally considered to be five years; b) the CVIS team, having learned a great deal through its previous development experience, felt capable of producing an even better system; c) CVIS was considered to be a good system for search and retrieval of information; however, the increasing emphasis on career education made a more comprehensive, second-generation system in support of sequential career development desirable; and d) CVIS was not conceptualized as a transportable system and therefore posed certain limitations to its users."*

Thus does Dr. JoAnn Harris Bowlsbey, leading developer of the CVIS system, describe the reasons for the current effort to design a new computer-based system that is strongly oriented to the processes of career decision-making. In July 1975 we visited Western Maryland College, Department of Education, in Westminster, Maryland to learn about the work in progress.

Background and Organization

The six member development staff is composed of a Guidance Development team directed by Dr. Bowlsbey and a Technical Development team headed by James Boyd. Work on the DISCOVER system was started in the fall of 1972 with initial funding from the Illinois Division of Vocational and Technical Education. Since July 1974 the project has been funded by the U.S. Office of Education under Vocational Education Research, Part C, and at that time the project headquarters relocated to Western Maryland College, with the technical team based at the College of DuPage in Glen Ellyn, Illinois.

Major Components of the System

The DISCOVER system was conceptualized in three separate, though interacting, parts: a guidance subsystem for direct use by individuals at three age levels (grades 4-6, grades 7-12, adult) seeking Career Guidance; a counselor-support subsystem for use by counselors; an administrative-support subsystem for use by administrators. Funding limitations have made it necessary to give priority to the development of the grades 7-12 guidance subsystem, with other elements of the guidance system, as well as the counselor-support and administrative-support components, to come later.

The modules under development for the guidance subsystem are as follows:

Entry: introduction to system; completion of a career development inventory.

Understanding My Values: interactive experiences in analyzing personal values and relating them to occupations.

Playing a Values Game: a Monopoly-like game introducing the concept of weighting values.

Learning to Make Decisions: programmed instruction in decision-making processes.

Practicing Career Decisions: using Super's "career decision tree" as an organizing principle for understanding how decisions affect occupational choice.

Learning How to Group Occupations: presents the world of work classified by data-people-things-ideas (ACT's refinement of the D.O.T. worker functions) and by Holland's six work-environment groups.

Browsing Occupations: exploring the lists of occupations which fall into each of Holland's six classifications.

Reviewing My Interests and Strengths: Holland's Self-Directed Search or ACT's Career Planning Program, administered on-line.

Making a List of Occupations to Explore: exploring alternate ways to generate a list of vocational options, utilizing values or the results of the Self-Directed Search or the Career Planning Program.

Getting Information About Occupations: reviewing information in detail about occupations tentatively listed.

Narrowing My List of Occupations: reducing the listing to a first choice and a limited number of others in order of priority.

Making a Specific Career Plan: obtaining information about requirements for entry into the occupation and choosing a specific training program.

The guidance subsystem will be field-tested in Baltimore County high schools beginning in early 1976 and will be ready for dissemination by September 1976.

Theoretical Substructure of the System

The designers of DISCOVER state that the system is basically eclectic, utilizing the developmental theories of Super, Holland and Tiedeman. They are attempting to bring together the best synthesis of the theories of vocational choice and the best career information obtainable. Importance is given to the student's need to understand himself--his values, interests and abilities--and to link self-information with occupational information. Emphasis is placed on teaching decision-making skills.

Means of Access

DISCOVER uses five means of access:

1. Relationship of occupations to personal work values
2. Results of Holland's Self-Directed Search or ACT's Career Planning Program-interests, life experiences and measured abilities
3. Entering code numbers of preferred high school subjects
4. Selecting titles from a list of occupations
5. Developing own strategy by combining selected occupational characteristics.

The occupational list can be generated by any of the above means. The process then calls for giving some information about occupations, narrowing the list and making a specific career plan. Information is provided in an interactive way, and in small pieces, letting the student ask for specific details.

The process of narrowing the occupational lists consists of looking for the "overlaps", the places where interests, abilities and values coincide, designating a high priority occupation. Information is then provided on course requirements, how to get the job, and a list of schools offering training.

Occupational Information

The occupational information file will cover 450 occupations. National information is being developed under a contract with the National Career Information Center of the American Personnel and Guidance Association. Local information will be developed by the user school or agency. Unlike CVIS, where national and local information (if any) are in separate files, DISCOVER proposes to integrate national and local data.

Educational Information

Two-year and four-year college information will be provided and updated annually by ACT. Public and private technical schools data will be based on a tape furnished biennially by the National Center for Educational Statistics of the U.S. Office of Education.

Student Information

The student enters the system by giving his birthdate and a confidential identification number. With regard to the personal data he inputs during the process of interaction, the student will have a choice of having it erased, allowing it to remain in the computer, or preventing others from monitoring specific portions.

Hardware and Transportability

DISCOVER is being developed for use on IBM 370 running under CICS, with a 3270 cathode ray terminal that has light pen capability. The system is being programmed in COBAL, which the designers believe will avoid some of the problems experienced by CVIS. It is their intent that DISCOVER should be distributed on a non-profit basis. An agreement has been reached with IBM that once the system is in the public domain, other vendors will be free to reprogram it.

Conclusion

In this chapter we have attempted to follow the advice of one of our respondents, the developer of a well known system, who advised us as follows in the course of a visit to the site of his installation:

> *"Pursuing the taxonomy of systems is a rather barren approach. Besides, it has been done. It would be much more useful for you and also for those who will read your report, but who have never seen one of these systems, to spend as much time as you can at the terminal of each one of them."*
>
> *"Then you should attempt to write them up* _**descriptively**_*. This is scarcely the scientific method. However, if you can make these systems seem real, if you can show them in full context, you will contribute more to the knowledge of those who have never encountered them than can be conveyed with any form of tabular presentation. Also, you should try to perceive the issues and problems that have been confronted in designing each of these systems for many are as yet unresolved."*

The length of this chapter is evidence of our efforts to follow our respondent's advice and to describe what we were able to observe. The time that could be spent at some of the terminals and in discussion with the system developers was all too brief and often highly pressured. Thus the goals of making the systems "seem real" and of showing them in "full context" may sometimes have eluded us. We can only hope that these same pressures of time did not result in more than minor inaccuracies of understanding and reportage.

As to "perceiving the issues and problems that have been confronted in designing each of these systems", we see them to be, most often, the same as those which permeate the theoretical underpinnings of Career Guidance itself. One virtue of the expanding use of these systems may very well be that their operations, if monitored and evaluated, can generate the very empirical data that so far has been lacking with respect to the outcomes of guidance.

The opportunities offered by the expanding use of computerized systems to increase our stock of needed information concerning these outcomes are now of a different order of magnitude than in times past. The capability of the computer to track and record the behaviors of its users; the fact that from among the large numbers of users representative sample populations may be selected for pretesting and post testing in order to compare the outputs of different systems; the circumstance that the systems will operate in the context of several different types of general counseling programs and community settings--all of these afford opportunities which if pursued with well-designed investigations can supply needed and detailed information on how the Career Guidance given future science majors can be improved.

Although the major issues confronting the designers of computerized systems appear to have their roots in theories of career development and in counseling approaches, others are more technical in nature. Some are problems of computer technology, where objective and expert consultation with an agency possessing the expertise of the National Science Foundation would be welcome if its availability were made known.

Yet other problems are related to producing the information that is delivered by the systems and to the organizational and other arrangements required to develop information having the requisite degree of accuracy, timeliness and detail. These will be addressed in the following chapter.

REFERENCES--CHAPTER VII

1. Dworkin, E.P., "Beware of False Gods", Personnel and Guidance Journal Vol. 49, No. 3, November 1970, p. 242.

2. Super, D.E., "Computer-Assisted Counseling: Present Status and Future Developments", in Computer Assisted Counseling, Super, D.E., ed., Teachers College, Columbia University, New York, 1970, p. 124.

3. Impellitteri, J.T., "A Computerized Occupational Information System", in Computer Assisted Counseling, p. 60.

4. Super, D.E., op. cit., p. 104.

5. Campbell, R.E., Vocational Guidance in Secondary Education: Results of a Survey, the Center for Vocational and Technical Education, The Ohio State University, Columbus, Ohio, 1968, p. 99.

6. Walz, G.R., "Technology in Guidance: A Conceptual Overview", Personnel and Guidance Journal, Vol. 49, No. 3, November 1970, p. 177.

OIAS

7. McKinlay, B., Developing a Career Information System, Final Report, Contract No. 82-41-7203, Manpower Administration, U.S. Department of Labor, October 1974, pp. 11-14.

8. Kroll, A.M., Computer-Based Systems for Career Guidance and Information: a Status Report, March 1973 (Manuscript prepared for publication in Focus on Guidance).

9. McKinlay, op. cit., p. 159.

10. Ibid.

11. McKinlay, B., Validity and Readability of the Occupational Information Access System "QUEST" Questionnaire, University of Oregon, Occupational Information Access Project, October 1971.

ECES

12. ECES III - The Career Development System, Mallory, A.E. and Friel, T., the Genesee Intermediate School District, Flint, Michigan, 1975, p. 3.

13. Kroll, A.M., op. cit., p. 14.

14. See Myers, R.A. et al, Educational and Career Exploration System, Report of a Two-Year Field Trial, Teachers College, Columbia University, New York, New York, 1972.

    For a condensed version of the results of this evaluation as well as other information describing ECES II, see also,

    Mallory, A.E. and Drake, J.W., Final Report of the Educational and Career Exploration System (ECES) for 1972-1973, prepared for the Michigan Division of Vocational Education and Career Development Services, Genesee Intermediate School District, Flint, Michigan.

GIS

15. Kroll, A.M., op. cit. pp. 14-16.

16. Super, D.E., op. cit. pp. 120-121.

SIGI

17. Katz, M.R., "Can Computers Make Guidance Decisions for Students?" College Board Review, No. 72, Summer 1969, College Entrance Examination Board, New York, New York, p. 13.

18. Chapman, W., Norris, L., Katz, M.R., SIGI: Report of a Pilot Study Under Field Conditions, Educational Testing Service, Princeton, New Jersey, 1973, p. 128.

19. Ibid., p. 118.

20. Ibid., pp. 2-3.

21. Ibid., pp. 5-6.

22. Ibid., p. 4.

23. SIGI: A Computer-Based System of Interactive Guidance & Information, Educational Testing Service, Princeton, New Jersey, 1974, pp. 10-11.

24. Kroll, A.M., op. cit., p. 21.

25. See Chapman, W. et al, op. cit.

CVIS

26. Harris, J., Computerized Vocational Information System - Counselor Manual, CVIS Demonstration Center, Willowbrook High School, Villa Park, Illinois. (This document is the source for much of the descriptive material on CVIS contained in this chapter.)

27. Harris, J., "The Computer: Guidance Tool of the Future", Journal of Counseling Psychology, 1974, Vol. 21, No. 4, p. 337.

28. Ibid., p. 335.

29. Ibid., p. 336.

CHAPTER VIII: GUIDANCE AND THE DATA BASE

Introduction

Earlier, we alluded to the intricate web of reports and studies, prepared for various purposes at several levels of government and also by private organizations, that in large part provides the data base of Career Guidance.

To describe the content of career information and the problems involved in its production and dissemination as a basis for framing recommendations aimed at increasing its quantity and improving its quality is complicated enough. However such a portrayal alone, even if successfully drawn, would provide an inadequate representation of the complexity and scope of its subject. With respect to its sources, processing, formating and dissemination, career information must unavoidably be viewed as but one subsystem in a larger whole--the labor market information system in its entirety. And this system, in turn, is related to the functioning of the labor market itself where activities both generate and are generated by information.

Attempts have been made to trace out these various information systems and subsystems and their interactions; to assess the needs for various categories of information and the purposes for which they are needed; and to design mechanisms whereby information sources and products, if developed to meet one objective, can supply data required for other goals. Descriptions of such efforts focusing on information needs and information systems at national, state, and local levels are available if a more comprehensive or a more detailed account of labor market information is wanted than our report will furnish.(1) At the cost of considerable oversimplification and many omissions we shall include in this chapter only those aspects of the subject having a direct or close relationship to the production and processing of career information designed primarily for students.

Background and Status of Career Information

Pressures are increasing upon the schools to turn outward to the world of work in the design and orientation of their curricula. These pressures account for the rapid spread of Career Education concepts and practices. And with a proliferation of computerized Career Guidance systems in prospect--systems insatiably demanding vast masses of data--it is something of an anticlimax to assess the present meager stock of career information. How, it could be asked, has it come about that demands for educational reform and advances in the means of information delivery have outpaced development of the information needed to support improvements in both education and guidance?

The answer to this question does not lie in any lack of legislative appreciation for the importance of labor market information, although this appreciation has not always been matched with commensurate funding.

As early as 1933 when the Wagner-Peyser Act created the United States Employment Service, the production and provision of labor market information was regarded as a major program of the service because this information was required in the operation of other programs, including the employment counseling provided to job applicants and labor market entrants.

World War II saw the emergence of many techniques for producing labor market information and a mandating of their use when decisions were required respecting the allocation of manpower and other resources. The availability of these techniques plus familiarity with the requirement of buttressing manpower policy with manpower information were evident in the successive legislative affirmations expanding and reinforcing the role of labor market information that appeared in the major employment and education enactments of following years. These included the Employment Act of 1946, the Area Redevelopment Act of 1961, the Manpower Development and Training Act of 1962, the Vocational Education Act of 1963, the Economic Opportunity Act of 1964, the Emergency Employment Act of 1971 and the Comprehensive Employment and Training Act of 1973.

To be sure, the combined impact of these acts, as each was followed by the next, was to spur continuing improvements in the methodologies employed to develop labor market information and to expand its utilization for a variety of purposes. However, the body of labor market information continued to be oriented more to needs at the national level for policy guidance, program development and legislative enactment than to needs at the level of schools, local agencies, and individual users such as vocational educators, guidance counselors and students. Thus, among the several categories of labor market information, Occupational Information is today one of the less advanced and the less developed, consisting all too often of many fragments from many sources, inadequately systematized and assembled into a structured whole.

However, two of the acts mentioned above contain provisions that are beginning to change the relative priorities of the labor market information subsystems. They promise to make a difference in the administrative arrangements and the programs that are now emerging.

The Vocational Education Act of 1963, as amended, Sections 103 and 123 (a) (6) (A), calls for federal, state and local officials and advisory councils to use current and projected manpower employment information in evaluating, planning, and allocating resources for vocational education.

The Comprehensive Employment and Training Act of 1973, Section 312 (a) states:

> *"The Secretary of Labor shall develop a comprehensive system of labor market information on a national, state, local, or other appropriate basis, which shall be made publicly available in a timely fashion."*

These acts between them have made the information needs of schools and of local government units more urgent and more visible. And, so closely meshed are the various components of a labor market information system that efforts to supply these needs will bolster the very information sources that would support a sounder data base for Career Guidance than has existed heretofore.

One effect of a rising interest in meeting the challenges of recent legislation and of satisfying the demand for a more adequate provision of occupational information is an interagency agreement for the development of occupational manpower information that was signed in August 1975 by the Deputy Assistant Secretary for Manpower and the Commissioner of the Bureau of Labor Statistics of the Department of Labor, and the U.S. Commissioner of Education of the Department of Health, Education and Welfare.

States the document these officials have signed:

> *"The purpose of this interagency agreement is to establish the national leadership essential to coordinate legislatively mandated activities related to occupational manpower information."*
>
> *"Specifically, the Manpower Administration and the Bureau of Labor Statistics of the U.S. Department of Labor and the Office of Education of the U.S. Department of Health, Education, and Welfare agree to (a) work toward the development of an occupational manpower information system that will satisfy the program needs of the three agencies, (b) coordinate research and related developmental activities in the area of occupational manpower information so as to avoid duplication of effort and maximize the effective use of available resources, (c) work toward the development of improved information on current and projected manpower needs at the national, state, and local levels and, to the extent possible, establish standardized concepts, definitions, and methods as related to the collection of occupational data and the projection of occupational needs, (d) plan and develop a systematic approach for obtaining, assessing and delivering information on manpower demand and supply, and (e) raise the level of understanding of the specific occupational manpower data, information needs of data users and developers at the state and local level through coordinated action and communication."*

To implement this agreement a three-member Occupational Manpower Information Coordinating Committee has been appointed, representing the signatory agencies. Its functions are to be in the area of Occupational Information. These will include identification of research and other program areas where interagency cooperation will lead to efficiency and avoid duplication, and recommendations to enhance program effectiveness. The committee is to sponsor workshops designed to improve communications among education administrators and planners and officials drawn from employment security agency personnel to the end that information needs will be assessed and manpower information objectives met.

Plainly, the charge to this committee is both to remedy various of the deficiencies that have left Occupational Information a lagging and fragmented component of a comprehensive labor market information system, and collectively to develop a better one. As such, the committee can provide a focal point to which the needs of other agencies and groups respecting Occupational Information may be addressed. Its potential for supplying coordinated leadership and for improving the production of Occupational and Educational Information matches that of the National Occupational Information Service for improving its dissemination--both to the advantage of Career Guidance.

The Content of Career Information

We have already defined career information as the sum of Occupational and Educational Information. It should be further specified that it is information of these kinds, needed in the process of career planning and decision-making, that is included under this heading.

In the field of Occupational Information a variety of components meets this specification. However, before listing them, some discussion is warranted concerning the criteria against which this information, in general, should be judged. Basic standards in the view of most users are commonly held to be: accuracy, timeliness, and detail.

Any prescript that occupational information be accurate should scarcely require emphasis, considering the personal stakes involved when it is used to assist career decision-making, particularly in the long-training-time occupations. The word "accuracy" as applied to career information, however, must be restricted to mean freedom from mistake or error rather than conformity to truth. The expenditure of immense amounts of labor and the exercise of constant vigilance in checking and re-checking the returns of respondents and reporters, in testing and re-testing the construct validity of the techniques employed in estimating procedures, or in accomodating to the vagaries of coding structures is expected and complied with by all competent analysts to achieve accuracy in the sense of exactness. To do otherwise is to lose credibility.

Accuracy in the sense of conformity to truth on the other hand implies that the projections necessarily forming a part of career information posess an infallibility they can not achieve given our political, economic and social institutions and the state of the art. In this regard, little more can be done than to state the assumptions upon which projections are based and to detail the most likely sources of error in their construction. Where the computer serves as the delivery medium, appropriate precautions are advisable to forestall any mystique of omniscience that might be ascribed to its output.

When variables associated with the individual user's characteristics are also introduced into the projection process, avoiding any appearance of omniscience becomes of particular moment. The precaution of substituting scaling terms such as "increasing occupation" or "declining occupation" for value-laden terms such as "good prospects" or "poor prospects" is conducive to a greater accuracy of prediction in the sense that the word must be understood in occupational projections. For, no matter what the state of labor demand/supply relationships, employment prospects will always be "good" for some and "poor" for others. "Michaelangelo", the Labor Market Analyst would hazard, "could always find a job as a painter."

Timeliness is relative to the perishability of the information to be conveyed. We have heard authorities in the field of occupational information maintain that every Occupational Guide and Occupational Brief should be burned when its two-year mark is reached. Certainly no occupational vignettes should go longer without review. However, to achieve an acceptable level of timeliness, every system should be subject to immediate entry for significant changes as well as to periodic revision. It is one of the most appealing features of computerized information that a single directive effecting data change at the central processing unit is immediately reflected in the output of every terminal in the system.

Again, on the subject of timeliness, spotty updating of data can introduce inconsistencies into an information system that make it counterproductive for decision-making. Any semblance of validity of wage rates or of other perishable items is destroyed when data for different time periods are being compared as between different occupations, or for the same occupation in different industries or geographic areas.

The criterion of detail is applied most often to occupational information as a measure of the number of items described along with the degree of localization in which they are described. The application of this criterion implies that the localization of occupational information is desirable per se, a judgment decisively substantiated by increasing experience in the dissemination and use of this information.

Practitioners cite the fact that career information must be sufficiently detailed to facilitate the job search of the terminal student who is also a job seeker. To be useful to him, occupational information must center on the geographic unit in which he will seek employment.

Arguments of a different sort are advanced for the localization of information about occupations with a state-wide or nation-wide labor market. Here it is argued that the information possesses greater vividness and greater credibility for the user if he can compare what he learns by way of the delivery medium with what he can observe in his own community. Further, it is as important to learn where jobs in the career of his choice are not as it is to be apprised of where they are. Only then can he knowledgeably introduce the factor of job-location into his decision-making, a factor that as often as not injects some painful trade-offs into the process. Also, no matter what the extent of an occupational labor market, differences pertaining to industry and geographic area are obliterated as community and regional distinctions are merged into the "average" that is the national picture. Finally, the employment outlook by occupation is a function not only of anticipated labor demand but of labor supply as well, a factor in the manpower equation that often can be appraised as to its dimensions and characteristics only locally, if at all.

General agreement exists as to the major subject areas requiring coverage in the occupational information used for Career Guidance. Differences of opinion are evident only concerning the comparative effectiveness of various media for delivering this information and as to the adaptations of style and approach that may be required for special populations of users. Some authorities stress an affective as against a cognitive emphasis in career information materials, and the amount of weight given to what is essentially job search information varies with the setting within which the system functions. Nonetheless, there is little or no dispute that the following items should be included in the content of Occupational Information and made available to the student when he is ready for career exploration and decision-making:

> Descriptive Information about the Occupation-this information can be presented with great parsimony of style, with little more furnished than an identification of the occupation by DOT code, a description of customary tasks and duties in typical occupational analysis terms, and references to other sources for additional information.
>
> Weight can also be accorded the frequently heard plea that some notion be conveyed of the "life style" associated with occupational membership. This objective is more nearly attained when a bare-bones description is fleshed out with detail about the usual characteristics of one's fellow workers, typical working conditions and the usual work setting, the industries and geographic areas where the job is found, opportunities for travel, and other than pecuniary rewards that may characterize the work. In any event, information supplied under this heading can be made more useful for those seeking immediate employment if it presents data about hiring channels and employers' recruitment practices. Its longer-term utility is enhanced if it also includes data about opportunities for advancement and about related occupations.
>
> Economic Information about the Occupation-this section provides a picture of current employment in the occupation giving as much detail as possible concerning its distribution by industry and geographic location and its composition by sex, ethnic background and age group.
>
> A characterization of current and projected labor demand-supply relationships in the occupation is essential. For the geographic area being described, this account should specify whether the occupation is one that is increasing, relatively stable, or declining, and what volume of new workers is required for replacement. It should also note the assumptions upon which the employment outlook is based--factors related to social and economic change, technological developments, demographic considerations, or whatever.
>
> Earnings and fringe benefits in the occupations must be specified together with hours worked and such costs to the

worker as union or association dues, and tools and equipment. Furthermore, the seasonality of employment in the occupation, the availability of part-time work and any factors affecting the duration or security of employment should be specified.

Personal Requirements of the Worker-describes the worker characteristics associated with his satisfaction and success on the job--interests, abilities, temperaments, and job-related physical attributes.

Preparation Requirements of the Occupations-sets forth the skill and knowledge requirements for entry to the job and, presumably, for successful job performance, as well as the legal requirements that must be met for employment such as age, licensure and bonding.

This section should also include a description of the ways to prepare for entry to the occupation and for advancement in it--the education, training and experience that is required, preferred, and conventionally accepted.

During his school years the student seeking Career Guidance may be more eager for Educational Information than for descriptions of occupations. Indeed, information about schooling may be of greater moment to the student because the most immediate career decisions confronting him probably concern a choice among majors and schools, or whether or not to continue in school at all. Inasmuch as what he learns will likely be implemented shortly, Educational Information must be both comprehensive and detailed. It should include substantial detail about both the programs that are available to him and about the schools or other institutions offering the instruction.

Related Post-Secondary Educational and Training Programs-Ideally, information given the student concerning education and training is related explicitly to the occupations for which the programs are designed to prepare him.

Hence he should receive information about the types of program that provide the required education and training for a given occupation, the degree specialities and options available as well as lists of schools and other institutions offering these programs. The program's length, cost and scheduling should be specified. A comprehensive system would include technical and vocational programs as well as information about the military and some forms of on-the-job training available locally.

Institutional Characteristics of Two and Four Year Colleges-Characteristically the information provided about schools is factual, detailing the type of school, degrees offered and schedules of courses. As usually presented, this information has been subject to something of the same type of criticism leveled at job descriptions which fail to convey a feeling for the life style associated with the occupation. Hence, there is encouragement to supply detailed information about student activities, student services, faculty and student attitudes, and other matters that will transmit some conception of campus ambience.

Customarily, the information presented includes size and type of enrollment, admission requirements and procedures, and graduation requirements. Of utmost importance to many students is the comprehensiveness of the information supplied concerning financial aid; the possibility of finding part-time work; tuition and living costs; and the availability of housing and various student services.

The Production of Career Information for Career Guidance

The basic elements of career information are quite obviously connected with employment in an occupation--its size, location, characteristics, prospects, and the demand for additional and replacement workers it generates. Labor supply for the occupation, available or potential, is also a part of the picture--those who are now seeking this type of work, who are potentially available to work in the occupation through reentry to the labor force or by a change of occupation or residence, or who are now preparing for the occupation.

The interaction of labor demand and supply at a given time and in a specific place yields the current relationship between the two with its manifestations in labor shortages, labor surpluses or a near equilibrium--together with its concomitants of changing recruitment practices, hiring specifications, opportunities for advancement and relative wage rates. And, as important or more so for career planning as the present relationship is that anticipated for the future.

Because this report is concerned with Career Information as the data base of Career Guidance systems rather than with any detailed account of its sources or the methodologies of its processing, some selectivity must necessarily be imposed upon our choice of subject matter at this point. We shall limit our treatment of this large and complex subject in the following ways.

We will concentrate upon the principal elements of career information and the major problems involved in its preparation irrespective of whether it is to serve as a stock of information available at the counselor's desk or is to be stored in a computer. In either case, the criteria by which it should be evaluated are the same. And in either case the same topics must be covered. However, more criticisms of its adequacy appear to arise in the instance of computerized systems than when it must be sought in books and pamphlets. Quite suddenly the gaps, deficiencies and inconsistencies acquire a high degree of visibility both because they are more apparent to the user dealing with a single integrated information source and because the wider audience reachable by this delivery medium brings more responsibility for the integrity of the information delivered.

We will also point to what is being done to remedy these deficiencies now that certain hurdles, administrative in origin, appear to have been surmounted and new initiatives such as NOIS are being undertaken, to say nothing of the increasing pressures applied to expand this body of information from sources as diverse as Career Educators and CETA agencies. Current, positive efforts to improve matters can more often be perceived as opportunities to provide needed assistance than can unrelieved litanies of inadequacies. Specific areas in which assistance would improve the Career Guidance provided to science majors directly or indirectly will also be mentioned.

Employment Data By Occupation

The basic source of employment data by occupation is the decennial census. Once every ten years, information becomes available showing the distribution of employment in each industry by occupation. The census occupational classification system with its 440 occupations, however, is not as detailed as that of the DOT nor is it sufficiently detailed, overall, for guidance needs. There are many errors because the data are obtained by self-reporting. Moreover, these data are presented upon the basis of the worker's place of residence rather than workplace. Once every decade, they nonetheless provide a matrix from which can be derived the occupational structure of every industry and the occupational composition of the labor force, both employed and unemployed for all communities, no matter how small.

The Monthly Population Survey, a sample survey now expanded to include 70,000 households a basis for state as well as national employment and unemployment estimates, does not provide sufficiently detailed information at less than the national level to be a significant source of occupational information through the intercensal period. Thus, it has always been necessary to look to other sources.

A widely used method of estimating employment by occupation at the present time is to apply the industry/occupational matrix derived from decennial census returns to current employment estimates obtained by way of the BLS Cooperative Employment Statistics program (CES). Under this program current employment statistics by industry are collected monthly from a sample of reporting employers and adjusted annually to the benchmark employment figures that become available through operation of the unemployment insurance system. Both of these series of figures are establishment-based rather than worker-residence based as are census data. After much editing and with considerable circumspection, they can be used for employment estimating for geographic areas below the state level--standard metropolitan statistical areas, counties, and various types of manpower planning and administrative areas.

Inspired originally by the exigencies of planning vocational education curricula considerable work has been done to construct estimates of current employment by occupation for states and for smaller areas, using this methodology. State and local analysts in making these estimates have generally followed a pattern of leaning heavily upon the Bureau of Labor

Statistics for technical assistance in the construction of the industry/occupational matrix and then carried through with much painstaking and laborious editing in order to correct and adjust the employment-by-industry data against which the census-derived matrix is applied.

In areas where extensive work of this sort has been accomplished (Ventura County, followed by other Southern California counties is best known for its efforts in this direction) (2) this exercise originally oriented to furnishing management information for vocational education planning has, in addition, proved to be a mainstay of Career Guidance. After identifying the location and volume of employment by occupation for the smaller areas, both counselors and students can be furnished graphic presentations of the matrix that show job groupings; they can also readily note the industries and areas where certain types of jobs are to be found. The quantitative data available, besides indicating the significance of specific occupations by area, supply the framework to which descriptive information concerning hiring requirements and other job data can next be added.

But this method of developing the statistical data basic to estimating current employment by occupation has its drawbacks. Much labor is involved in reconciling the census classification systems for occupation and industry with other coding systems so that census figures can be applied to establishment-based data. A more basic defect is the absence of a mechanism to show for smaller areas the changing occupational structures of various industries throughout the intercensal period or to signal the emergence of new occupations.

Accordingly, a very high priority has been assigned to developing a system that will periodically report the occupational distribution of establishment-based employment in finer detail than the census.

This system--the Occupational Employment Statistics Program (OES) has now been extended to twenty-eight states and to the District of Columbia, with funding supplied by the Manpower Administration and technical assistance by the Bureau of Labor Statistics. In three of these states, money has been appropriated by the state legislatures to buttress work on sub-state level projections.

Leaders in the field see the OES--despite its costliness and the additional burden it imposes upon the employers sampled--as the best hope for ultimately doing a quality job in tracing and projecting occupational trends. In consequence, it has been supported when funds were scarce even to the extent of jettisoning other reporting activities which, although valuable, were not deemed to have as high a priority as the OES.

The report yields comprehensive information in that the data can be used to formulate national, state, and local estimates. And a system that is "comprehensive" in this sense is believed to be of as great importance to those with the interests of a specific target group in mind as it is to those viewing information needs in more general terms. Even when an occupation has a national labor market, knowing how it is practiced locally gives reality to descriptions of the job. Further, the best trend data frequently emerge from surveys of local developments.

Employment Projections by Occupation

The process of converting projections of employment-by-industry to occupational employment projections has many similarities to that of translating current estimates of employment-by-industry into occupational employment estimates. Again the Bureau of Labor Statistics supplies more or less "mechanical" models, and it is left to state and local labor market analysts in the employment security agencies through such research activities as they can mount to adapt these projection models to expectations for their state-wide and major labor market areas.

The workload that has devolved upon both the comparatively small unit in the Bureau of Labor Statistics supplying technical assistance to the states, and upon the state agencies in performing the research required to transmute these forcasting models into sound localized employment projections has been substantial. Nonetheless, and despite many protestations by the state agencies that the magnitude of the task has not been matched with resources to accomplish it or the priority accorded the enterprise, the great majority of them are now publishing employment projections by occupation.

Improving these projections, however, is a much sought-after goal in many quarters and one where assistance designed to help in achieving it would be welcome. This assistance could take several forms. Continuing investigation is required to improve projection techniques at the local level. An agency such as National Science Foundation, concerned with the guidance of a special population, could make a valuable contribution by sharing any information it might have or could develop concerning occupational change factors for work within its areas of interest and expertise-occupations in science and technology in such fields as energy or ecology, as examples. Relaying through channels information that might come to that agency about the award of contracts that might significantly change the demand picture in certain localities, or transmitting knowledge of trends at academic institutions that could be expected to change anticipated supply in certain specialties over the longer term, would be most helpful to state and local analysts in the affected geographic areas.

But possibly the greatest service that could be rendered by an agency that is mindful of the information needs of a special population would be its viewing the production and dissemination of Occupational Information in systems terms. As matters stand, activities are too often uncoordinated and the output fragmented. With mechanisms evolving that will provide focal points for bringing together both knowledge of information needs and of information sources, new opportunities are in the offing and should be seized both for improving the stock of career information in general as well as that provided to special groups.

Labor Demand/Supply Relationships

"Employment outlook" or "employment prospects" is a key element in the body of Career Information, despite the fact that secondary school students in the exploratory stages of their career planning frequently fail to include this item among the information they most want to know. The relationship between labor demand and supply upon which employment outlook rests will obviously become increasingly important to them as they move from highly tentative career choices to decisions committing them to long and costly educational programs.

It is usually difficult enough to establish the current relationship between labor demand and supply by occupation, although the lists of unfilled job openings or "shortage jobs", the occupational distributions of claimants for unemployment insurance, and certain broad occupational data derived from the CPS do provide some help in attempts to quantify these relationships. But even if these data were more satisfactory indicators than they are of all recruitment efforts for workers in given occupations, or of the total number of workers seeking jobs in the occupation, there would still be controversy as to whether or not the relationship described represents the "true" picture. In the case of shortage jobs it can always be argued that a substantial proportion of the demand reported is not effective demand. Where the number of job seekers is substantial, it can be maintained that a sizeable percentage does not constitute a realistic source of supply given the hiring specifications operative at the time. Nonetheless, enough statistical data is available to establish at least some parameters around the extent of such disagreements when it is the current relationship that is in question.

Moreover, steady progress by the Manpower Administration in developing Job Bank data (a product of computerizing employment service job openings) so that they are usable in employment counseling has produced a body of information which, despite its shortcomings in representing the total demand/supply relationship by occupation, does provide some hard data concerning the current situation. Also, it is of interest to note the extensive use of Job Bank data by those developing information for use in the computerized Career Guidance systems. This again speaks for the appeal of localized data as a means of increasing the "realism" and thereby the credibility of Career Information.

As compared with forecasting the shape of a future market, however, the problems of producing acceptable information about the current labor market situation by occupation are minor. This point need not be labored except to state that the demand side of the equation which is known when appraising a current market joins the cast of unknowns when the forecast of its future interaction with supply must be described. In this connection, it is critical for those using the forecasts as well as for those who construct them to recognize that the anticipated demand which is being estimated will be a function of future market conditions and not of what may now appear to be (because of social or demographic considerations) an inevitable strong need for the goods or services produced.

In arriving at acceptable estimates of employment prospects by occupation the task of estimating future labor supply is more of a problem than is estimating future demand. In peering into the future so far as demand is concerned, it is customary to rely upon estimates of the future gross national product and of the composition of the GNP based upon known economic assumptions. Next, the impact of the forecast levels of production is followed through for all industries and occupations making up their employment. The results of this methodology do establish some metes and bounds for at least the national projections. These, in turn, can be distributed among the states and areas as more detailed research at the local level indicates.

Estimating future labor supply by occupation is a more hazardous venture. Here, again, some outside boundaries do exist, in this case limiting the size of projected total labor force. These include such factors as population estimates, trends in labor force participation, and broad changes in economic and social customs. But the fluidity with which labor market adjustments occur makes it particularly difficult to take into account the effect of many factors which can influence the expected size of the supply of workers for a specific occupation. Among many others these include the migration of workers from one area to another, transfers from one occupation to a different one, the reentry into the labor force of workers not previously regarded as constituting a potential labor supply for the occupation in question, and the mysterious workings of the so-called "internal labor market."

Mis-estimating employment prospects, although unfortunate in any case, is most costly to those preparing for the long-training-time occupations. Hence, recent and present efforts to improve the techniques of estimating future labor supply have centered about identifying those who are now being prepared to enter various occupations. During the period when students and trainees can be recognized as highly probable candidates for membership in a specific occupation because they are enrolled in related educational and training programs they can at least be counted even though the geographic area in which they will ultimately seek employment can not always be anticipated with accuracy, nor can students enrolled in the more general programs be neatly categorized as potential applicants for a particular type of work. Nevertheless, much of the research currently being carried on at local levels in order to improve techniques for estimating future labor supply by occupation is concentrated upon the potential supply of occupationally prepared students expected to become available during the forecast period--an enterprise of considerable importance not only to those preparing guidance materials but also to those with responsibilities for curriculum planning and manpower needs assessments.

Agencies such as the National Science Foundation, having especial concern for the guidance needs of particular populations and with access to information about developments in their academic preparation, could be of help in improving the guidance given to these groups were they to undertake studies associating the completion of given programs and majors with subsequent employment experience.

Presenting Information about Occupations

Thus far, this account of the production of Occupational Information for Career Guidance has included only the basic quantitative framework which must be put in place for each occupation before adding the wealth of information that is needed to make the descriptions of jobs in these occupations "come alive". For the student with limited opportunities to obtain information regarding what one respondent called the "sight, sound, taste, smell and feel" of an occupation, either experientially or by direct observation, sensitively prepared descriptive material concerning the occupation can be of as much importance as accurate employment statistics.

Some of the data falling within the category of job description is as quantitative in character and as demanding in terms of sound research and statistical procedures as is employment estimating. Wage information is an example. Some of the information regarding required hiring specifications--courses completed, job-related physical capabilities, union membership--is equally a product of careful empirical research and is best presented in a concise, factual style. Likewise, information detailing educational programs that prepare for an occupation, and descriptions of the institutions that provide this preparation, is often the product of a most difficult type of investigation--depending first upon extensive questionnairing and next upon extremely knowledgeable evaluations of the collected data in order to appraise the sometimes less than accurate claims of competing schools and training agencies.

However, those other aspects of a job whose more felicitous presentation would convey some notion of an occupation's life style demand other perceptions and sensibilities from those preparing guidance materials than the skills connected with statistical expertise.

In this connection, the chief of an important federal program in the guidance field remarked that he believed

> *"one of the more useful things that NSF could do would be to conduct some experimentation with published guidance materials in order to learn what items of content and what styles of writing will best get through to science students. Government people are 'substance people'. They look at the validity of materials and the techniques of producing them, not at the question, 'how do you get through to specific groups of people such as science students or the gifted?"*

With the addition of descriptive information to the statistics-based structure of Career Information--detail concerning occupations, detail concerning the schools to attend and the majors to follow--a vignette describing an occupation and the preparation required for entry has been prepared that may relate to the national labor market, a smaller geographic area or to both. The information it contains may be stored in a computer, published in a book or brochure, or presented by audio-visual means. Whatever the area covered or the delivery media employed, however, chances are excellent that those who prepared the information used the Occupational Outlook Handbook produced in the Division of Manpower and Occupational Outlook of the Bureau of Labor Statistics as a starting point for their investigations and a model with which their conclusions had to agree. No source of information on occupations was more widely cited by all users of Career Information, from the individual counselor with this volume on his desk to the commercial publisher of guidance materials and the data-developers for computerized Career Guidance systems. The extent to which any degree of centralization and coordination in the preparation of guidance information has existed up to this time is a tribute to the contributions of the unit which include the preparation of the Handbook and the Quarterlies, and much of the technical work accomplished in connection with the occupational matrices and projections.

It is by way of this Division's close cooperation with the national professional societies that the results of these Societies' original research find their way to a far wider audience than they could otherwise.* Again, it is this Division's own original research--in questionnairing employers, observing an occupation at the work site, contacting workers and worker organizations--that produces the basic occupational materials that can with additional research and processing as is done by several of the commercial publishers of guidance materials be tailored to the specific needs of particular categories of users.* *

Given the Division's strategic location in the network of agencies and organizations responsible for the components comprising guidance information and for producing the materials which convey it, we requested suggestions from its staff on what other agencies might do to improve the Career Information provided to their particular constituencies. In the matter of improving the guidance materials prepared for science students, the suggestion was made that the National Science Foundation should first make a comprehensive and thorough survey of the Occupational Information that is available to science students at the secondary school level. This body of materials should next be evaluated for its completeness. If the Foundation were to judge that there would be value in adding to the Handbook emerging occupations or occupations having some special significance to the scientific community, pressure should be brought to include the occupation, no matter how small.

In fact our respondents thought it might be advisable to include all science occupations in the Handbook, whatever the size of their employment. It is as important, they believed, to the individual student undertaking the long and costly education required for entry into most science occupations to know as much about prospects in those jobs where employment is small as in those where it is large. It was also mentioned that a separate publication specifically designed for the use of students at the secondary level who are interested in careers in science and technology might well be worth support. Specialized publications directed to particular groups of users appear to have more appeal and acceptance than those prepared for a general audience. When the Bureau of Labor Statistics at the urging of the College Placement Council published a document for college graduates, the size of its distribution immediately exceeded all expectations.

---

*See Appendix, pp. VIII-1 to VIII-2 for the returns received from questionnaires sent to the national professional societies that related to occupations in science and technology.

**See Appendix, pp. VIII-3 to VIII-4 for the returns received from questionnaires sent to the commercial publishers of guidance materials related to occupations in science and technology.

Beyond the problems of supplying useful and attractively presented information for the use of new entrants to the labor market, a final suggestion was made concerning the information needs of experienced workers. There was the comment that the Foundation should support studies delving into the question of what is the employment potential in other fields, possibly in new and emerging activities, for workers who prepared and possibly obtained work experience in occupations that are now in surplus, as in science teaching or the aerospace occupations. Indeed, such studies might disclose the relatedness of certain jobs, information that can be as valuable at the career planning stage (when additional training can be undertaken as a form of insurance) as at those moments in a career when retraining and retooling offer the best possibility for reemployment.

In sum, it should not come as a surprise that the data base of Career Guidance must be broad if it is to support a system that is sufficiently comprehensive to supply usable information not only at a career's beginning, but through the successive changes of career content and direction that may be required in these changing times.

Conclusion

In the foregoing Chapter, we have dealt with the data base of Career Guidance more in breadth than in depth. This we have done in order to cover a broad range of topics, for the suggestions of our respondents concerning the feasibility and desirability of National Science Foundation participation and assistance in this field were equally wide-ranging. Recommendations based upon these suggestions as well as upon others made to us in the course of this study follow in the next Chapter.

REFERENCES--CHAPTER VIII

1. For descriptions (some analytical some directed to the exigencies of administration at different levels of government) of both real and ideal labor market and career information systems and of needs for this information, see:

   Yavitz, B., Morse, D.W. with Dutka, A.B., The Labor Market: An Information System, Praeger, New York, New York, 1973.

   A Labor Market Information Program for Region IX, Manpower Administration, U.S. Department of Labor, Manpower Administration, Region IX, San Francisco, California, September 1975.

   Report on Job Search Information, Job Market Information and Manpower Data in the California Department of Human Resources Development, U.S. Department of Labor, Manpower Administration, Region IX, San Francisco, California and the California Department of Human Resources Development, Sacramento, California, May 1972.

   Thal-Larsen, M., Laner, S., and Mayall, D., Requirements and Design of a Labor Market Information System for a Large Metropolitan Area, Department of Industrial Engineering, University of California, Berkeley, 1972.

2. For an extended description of this work, see Manpower Management Information Dissemination Project: A Project Developed Under the Vocational Education Act of 1968--Public Law 90-56, Part D. Ventura County--Superintendent of Schools (Project Co-Directors, John L. Van Zant and William H. Lawson) in cooperation with the California State Department of Human Resources Development; The California State Department of Education; the California Community Colleges, Chancellor's Office, July 1974.

CHAPTER IX: RECOMMENDATIONS

Introduction

For as long as the oldest practitioners in the field of labor market information and its users can remember, the ubiquitous complaint has been that there is no "system." This charge has been voiced at all levels of government and by officials exercising an assortment of functions. It has been an omnibus phrase expressing frustration brought about by a variety of deficiencies.

The local analyst has seen lack of planning and coordination result in information gathering that was at once duplicative for respondents and reporters and replete with gaps for users. Administrators attempting to impose accountability have found mountains of reports giving birth only to mice so far as the production of usuable criteria, indicators, predictors and other evaluative tools was concerned. Officials at the highest levels of concerned agencies deplored the fact that responsibility often rested with one unit of government while the funds needed to carry out these responsibilities were held by another.

Those engaged in Career Guidance have had equivalent problems as their field has become a battleground of conflicting theories and divergent practices. Disagreement in this area may sometimes have waxed so warm and lasted so long because there could be so little testing of claims against reality. As one writer has stated,

> *"Expert opinion is the primary basis for resolving Career Guidance issues. The lack of empirical data to support or modify existing and recommended practices is dramatic."* (1)

With this background to the problems and issues we have attempted to confront and to document in this study, our recommendations are tinged throughout by two considerations.

First, we believe that there is a new appreciation of the interrelatedness of the various components of labor market information and of the coordination which must be effected in the means devised to ensure that this information is economically gathered, processed and disseminated and knowledgeably used. With this growing appreciation, there can be hope that a variety of functions, one of which is Career Guidance, can soon be more adequately served than in the past. To this end the Congress has asked for a comprehensive manpower information system. Agencies have expressed their willingness to produce a comprehensive system in the only way possible--through coordinated effort. One agency is encouraging the creation of consortiums of information, producers and users in the states, an innovation which, if successful, will eventuate in systems rationalizing the functions of information production and dissemination.

Opportunities to be seized and profited from through concerted and coordinated efforts can be detected in these developments. Thus we believe that agencies mindful of the needs of particular constituencies and desiring to assist them should act in concert with other organizations concerned with the more general aspects of the total problem of improving Career Guidance in general and the data base that supports it.

We could not always be certain of the specific types of actions that the National Science Foundation is equipped or prepared to undertake. For that reason, we may in some instances be proposing actions that the Foundation could not enter upon directly but which, through its counsel or influence, it could assist another organization to carry forward. Throughout our investigation, we have been impressed by the eagerness displayed by officials in various agencies to enlist what they termed the "expertise and the objectivety of the NSF" in their efforts to improve Career Guidance and its data base.* Most likely, Foundation efforts in such a combined enterprise would find their reward in the improvement of Career Guidance for science majors, particularly if observation and empirical research were to show that certain special accomodations in general practices were required to serve the special needs of this particular population. This may well also be true of various other specific populations with their own specific characteristics and needs.

Second, we see the times as bringing an increasing number of opportunities to investigate the results of new initiatives in Career Guidance. The field is rife with experiments and innovations. Two of them, Career Education and Computerized Guidance systems, loom large and should be closely monitored for their impact upon the guidance of science students. In fact, there should be not only monitoring but also actual experimentation to determine which facets of these new approaches have special utility or appeal for the science student and how they can best be adapted to his needs.

The recommendations that follow--recommendations which, for the most part, have come from those we have interviewed and questionnaired in the course of this study--should be viewed in light of the foregoing considerations.

Recommendations

What students want by way of Career Guidance should be investigated and heeded. It is recommended:

1. That the National Science Foundation organize a conference recording and making available its findings regarding the desires and needs of science students for Career Guidance, including the content of the career information they wish to receive and the means by which it is conveyed. Conferees should include high school students with strong capabilities for entering science careers, parents of such students, high school counselors, developers of major Career Guidance systems, and outstanding

---

*See Appendix IX for what other agencies are doing at the present time in the fields of Career Guidance and Career Education.

scientists.

In its final sessions or at a follow-up conference, additional conferees should be selected to reflect the views of recent high school graduates now majoring in science at the post secondary level and of recent college graduates now on their first jobs.

2. That actions indicated by way of the above conference proceedings as having a potential for improving the Career Guidance provided future science majors be implemented with support from the Foundation. What actions may then appear to have the greatest utility can only be guessed at this point. They might include conducting sample surveys to test the representativeness of views expressed at the conference; commissioning the preparation of such exemplary materials as books, pamphlets or audio visual aids, designed in tune with students preferences, and subsequently evaluating their reception and use by high school science students; designing and testing experimental modifications of computerized systems, or experimenting in such areas as curriculum content, counseling practice, or exploratory work experience in line with science student preferences respecting means of information delivery, and subsequently evaluating their reception and use.

3. That the above investigations and experiments, whenever possible, include in their design, first, the objective of studying the behavior of science students in career planning and the effects upon this behavior of supplying them the information they want by the means they prefer and, second, comparing the relative appeal to, and impact upon, science students of different information content and alternate delivery media.

Many questions remain to be resolved in career development theory. Where information can be obtained leading to their resolution through literature search, the support of new investigation oriented towards gathering relevant empirical data, or an enlargement of work in progress on related subjects to encompass additional objectives to this end, it is recommended:

4. That the National Science Foundation (although its all-encompassing goal should be to develop a theoretical structure for Career Guidance possessing explanatory adequacy and satisfactory empirical support oriented to affecting a wide span of guidance procedures for all students) encourage study of those external events, influences and environmental factors as well as achievements that appear to shape personal orientation in the direction of careers in science and technology.

5. That the Foundation encourage experimentation to determine if certain practices are more effective than others in the guidance of students exhibiting high capabilities for or interest in pursuing careers in science and technology.

6. That there be study of what special programs are needed by particular groups in order to encourage towards careers in science and technology qualified individuals, disadvantaged in some aspect of their situations, who require particular attention to raise their aspirations and achievements to the level of their capabilities. And that there be follow-through on the results of this study by developing programs that will increase the degree to which these individuals are made aware of the various career possibilities open to them.

7. That the services to science students made possible by the implementation of various Career Education concepts be investigated.

8. That there be encouragement of attempts to substantiate with empirical evidence the linkages that are postulated to exist between such constructs as values and interests and certain occupations. Such investigations should be accompanied with research to discover the comparative effects upon the information that will be displayed by computerized systems because of employing an access route based upon one rather than another construct.

9. That efforts be supported which seek to identify those factors in a science students' career development and in the guidance he receives which will ultimately contribute most to his satisfaction with the educational and career choices he has made.

Efforts to "improve" Career Guidance in general and that provided future science majors in particular would be better informed if based on more complete knowledge than is now available concerning the present status of guidance practices as well as better documented appraisals of their efficacy for the guidance of science students. For the purpose of obtaining this sounder basis, it is recommended:

10. That the National Science Foundation, either alone, or preferably in concert with other concerned agencies, fund an investigation designed to ascertain the present status of Career Guidance practices in the nation's high schools. This investigation should be based upon a scientifically drawn sample of individual school districts giving appropriate weight to the districts' geographic location, population size, socio-economic characteristics including the educational attainment of its population; the organization of its school administration and counseling department; and such other variables as may be judged relevant to the sample selection.

    The questions asked concerning the selected schools' counseling departments and guidance practices should be aimed at determining the prevalence of various guidance practices together with their theoretical undergirding, the size and character of counseling work loads, the characteristics of counseling departments, the training and certification of counselors, the adoption of various innovative practices, the career information supporting guidance and how it is utilized by school staff and made available to students, and an exploration of any other subjects related to the survey's objectives.

That as part of the survey, or of another succeeding it, the same respondents be questioned respecting their attitudes towards, and practices directed to providing, special career attention for specific populations such as women, racial minorities, the gifted, and students with strong capabilities for entering careers based on science and technology. In particular, questions should be asked about the counselors' assessment of the potential for the guidance of science students of any counseling innovations already put in place or anticipated.

11. That this survey or surveys be followed by actions considered appropriate in light of its results. These actions might include such general approaches as seeking legislative and other support to redefine the role of school counselors and reorient their training, to develop standards for paraprofessionals working under the supervision of counselors, or to establish a category of counselor specialists to provide Occupational Information. Or among these actions might be more specific measures such as promoting the teaching of science in the early grades or working to develop more accurate information about educational and employment opportunities for future science majors.

12. That the Foundation encourage the sponsoring of research by other agencies, or itself initiate investigations, concerned with various major questions basic to guidance practice.

    These might include, although they should not be limited to, further research on the question. Under what conditions does providing information make a difference in altering behavior? Does testing make a difference--is there any relationship between the amount and kinds of testing given and the outcomes of Career Guidance? What is the comparative effectiveness in accelerating a student's progress towards vocational maturity of conveying career information by means of curriculum content, exploratory work experience, one-to-one counseling, group counseling, or such media as books and pamphlets, audio-visual materials, and computerized information delivery?

The Career Education movement shows signs of supplanting or of incorporating under its aegis the more traditional forms of Career Guidance. Thus, as Career Education should be a high priority area for investigation and action, it is recommended:

13. That the National Science Foundation examine such Career Education practices, specifically to determine their potential for future science majors, as using career oriented methods and materials in the instructional program and providing observational work experience and work opportunities for students and for those who educate and counsel students.

14. That if this initial examination indicates the utility of doing so, the Foundation sponsor investigations to identify the kinds of learning experiences that provide an adequate exposure of the aptitudes and interests needed to embark on a career in science. According to Career Education concepts these experiences should start in early childhood and be sequentially developed until the decision-making stage is

reached so that the student may arrive at a self appraisal of his aptitudes, interests and values.

15. That the Foundation, if these preliminary investigations warrant such action, commission with the full cooperation and assistance of the teachers who will use them, the writing of exemplary modules to be used in science and mathematics curricula. These modules should incorporate career awareness into the curricula and also relate science and mathematics concepts to applications in the world of work.

16. That the effects on career development of early and consistent exposure to all sciences should be investigated and evaluated.

17. That, in line with Career Education beliefs in the efficacy of exposing students to the world of work, guidelines should be prepared that school districts can use for developing community resources in the science occupations, including guest speakers, job site field visits, and work experience opportunities.

    In addition, if more concrete contributions along these lines are feasible, the Foundation should use its good offices to encourage the employers of large numbers of personnel in occupations based in science and technology to cooperate with their local school districts in providing exploratory work experiences for selected science students. The effects upon the student's career development of such cooperative efforts should then be evaluated and, if favorable, the design and procedures of these exemplary projects should be circulated to other employers and schools with the potential of repeating them after appropriate modification to the local scene.

18. That the Foundation, in its participation in Career Education projects directed to the career development of future science majors, not restrict its interests and activities to only the college bound. The continued advancement of science and technology would appear best served by providing students who may later work at any occupational level in these fields with guidance leading to their later career satisfaction.

Indications abound of the early and extensive adoption of computerized Career Guidance systems by school districts and large administrative units throughout the nation. As these systems should be a high priority area for investigation and action, it is recommended:

19. That the National Science Foundation, because its expertise and objectivity in conducting such an investigation would be unquestioned, should undertake to compare the efficacy of various systems of computerized Career Guidance as measured by their outcomes. Such comparative research and evaluation of alternate delivery systems should include, though not be limited to, appraising the advantages and disadvantages of using different information accessing strategies, and of classifying and structuring occupational and educational information in different ways. It should also focus on the comparative merits as to

transportability of the hardware employed, the relative appeal of the equipment used at the terminals--teletypewriters, CRT's, and printers yielding materials to be retained by the user--and real costs and performance comparisons.

20. That the impact upon specific populations, including science students, of the different computerized systems be thoroughly investigated and evaluated.

21. That the relationship between the efficacy of a computerized Career Guidance system (with volume of student use and their subsequent making of further efforts at career exploration serving as two criteria of efficacy) and the setting within which it operates be explored. This exploration might well include testing the feasibility of various arrangements for providing the administrative setting within which such a system could most effectively operate.

22. That, in accordance with the urging of various guidance authorities, some Foundation resources be expended "on advancing computer technology to a point where a truly interactive system operating on a sound theoretical base is feasible"--even though others would argue that these same resources would be better expended on resolving the multitude of data base problems that will be exacerbated by the rapid spread of computerized systems.

23. That, as school administrators urge, the Foundation continue its support for computerized records management which in some systems can share the same equipment as that used for the delivery of computerized career information.

    In this connection the cost effectiveness of utilizing dedicated equipment as against shared equipment might well be explored, and also the comparative advantages and disadvantages of "mini-computers" as against Central Processing Units with slave terminals.

24. That the major computerized systems now operative be surveyed as to their unique potential as research sites for the investigation of specific aspects of this form of information delivery: as examples, SIGI's claims to constituting a form of science education; the comparative impact upon science students of the various means of conveying information that are included in ECES' multimedia approach; the effects upon the student's subsequent career exploration and career development of OAIS' meticulous localization of Occupational Information; and the comparative effects as to the information later displayed of using one or another of the alternate access routes available to users of DISCOVER.

The rapid proliferation of computerized Career Guidance systems and the continuing implementation of Career Education concepts promise to make current deficiencies in the data base of Career Guidance more glaring and more troublesome in the immediate future. To speed development of information in meaningful form, meeting the criteria of accuracy, timeliness and detail and of reliable career information delivery systems in states and local areas, it is recommended:

25. That the National Science Foundation coordinate its efforts to improve the data base supporting the Career Guidance of all students with those of other agencies pursuing the same objective, and that its necessarily more parochial efforts to improve the data base supporting the Career Guidance provided future science majors be directed to areas where they can be most effective.

    Focal points to contact, to assist, to seek assistance from and to coordinate such efforts with, include (though they are not limited to) the Occupational Manpower Information Coordinating Committee, representing the three signatory agencies to the interagency agreement for the Development of Occupational Manpower Information of August 1975; the Division of Manpower and Occupational Outlook of the Bureau of Labor Statistics; various units in the Manpower Administration (having, similarly to the Bureau of Labor Statistics, close ties with the state employment security agencies) including this agency's Office of Manpower Policy and Planning and the Office of Technical Support of the Employment Service and, most importantly, its National Occupational Information Service; the Office of Career Education of the US Office of Education and the Division of Education and Work Program of the National Institute of Education.

    Only through strong initiatives at the federal level, (usually obtainable solely through coordinating the efforts of several agencies and organizations) can the technical assistance and centrally developed information be provided to the data developers of computerized systems and to Career Education project directors that can forestall a chaos of unassisted, uncoordinated and often inexpert efforts to produce the localized occupational and educational information needed to support these systems and projects.

26. That the Foundation contact the Division of Manpower and Occupational Outlook of the Bureau of Labor Statistics with several ends in view--these should include a request for technical assistance in conducting a comprehensive survey to determine just what career information is now available in science occupations. An evaluation of the usefulness of its content for the Career Guidance of science students at the secondary school level might also be included with assistance from the National Vocational Guidance Association. (2) The Foundation should also bring pressure on the Bureau of Labor Statistics to include all occupations in science in the Occupational Outlook Handbook, no matter what the size of their employment, and all occupations in technology that are emerging or that have some special significance for the scientific community. Possibly, supporting a publication prepared by BLS that is specifically designed for students at the secondary school level who are interested in careers in science and technology should be considered. And National Science Foundation assistance should be offered to BLS in connection with supplying any information that it

can itself generate or encourage others to produce concerning the occupations in which the Foundation has an interest. Such assistance, serving to buttress the comprehensive system of producing employment data including occupational projections which supports the Handbook, has a multiplier effect because of the tendency of almost all producers of occupational labor market information to lean so heavily upon this source.

27. That the Foundation, upon its own initiative or with the cooperation of other agencies develop information of particular significance to its own efforts at improving the Career Guidance provided future science majors. These investigations might well include, although not be limited to, gathering information concerning the "art" of developing guidance materials for NSF's particular constituency-(what types of guidance material presentations have a special appeal for science-bound students?); information concerning the factors that periodically discourage students from preparing for occupations in science and technology and how the effects of these factors can be mitigated by the approaches taken in the preparation of guidance materials; information concerning occupational clusters in the fields of science and technology that would permit the formulation of prudent educational plans, based on the transferability of skills, when preparing for occupations where expected obsolescence is predicted as unusually likely; and related information concerning the employment potential for people who have recently prepared for occupations in science and technology now in surplus.

28. That the Foundation itself initiate, or assist the efforts of others to conduct, well-designed research to increase the present stock of knowledge about projected labor supply, particularly for those occupations in which it has an especial interest. An expanded technical effort is required to provide more adequate information on this subject. Possible directions for research might well include, although not be limited to, investigations designed to translate specific academic programs into sources of labor supply for particular occupations in science and technology; to trace the impact of changes in social concerns or social policy (such as the change in emphasis from space to ecology) upon students' choices of college majors and upon the occupations represented in their first jobs; to trace out from university records the occupations in which graduates with science majors obtained their first jobs in the 1972-1975 period and from employers if jobs were emerging during this same period for which there were few or no candidates with appropriate, formal training. In other words, to determine the "fit" that existed in the recent past between the college preparation of science students and the availability of employment opportunities at the entry level.

29. That the Foundation itself initiate or assist the efforts of others to improve the system of projecting future labor demand--either in general, or for the occupations in which it has a particular interest and about which it may have or could obtain the best available information concerning future developments. Particularly needed is knowledge concerning occupational change factors and also information that could be helpful in localizing employment projections. This latter could stem from advance knowledge about probable technological developments or contract awards affecting specific states or local areas.

Also helpful would be technical assistance towards resolving the knotty problems involved in translating from one to another the various occupational, industrial and education codes used by different agencies of government for classification purposes.

Further, there could be occasions when the Foundation might use its good offices to encourage large employers particularly government installations with which it may have close relations, to develop more and better data for purposes of formulating projections for state and sub-state areas. These data should include continuing study of job descriptions, occupational change factors, and anticipated employment developments.

30. That the Foundation contribute input to the National Occupational Information Service (NOIS) with its potential for improving the production and dissemination of career information. As this service is still in its formative stages, it may be inadvisable to attempt specifying in any detail, or as examples, the specific inputs that might be offered or the benefits to the Foundation that might accrue from such cooperation. However, it has been suggested that the Foundation's highly objective and genuinely expert knowledge of computer systems could be brought to bear upon solving the technical problems that will be faced by the states receiving support under this program.

It is probable that a computerized library of all source materials in the field of career information will be set up in connection with the NOIS program. If this is done, NSF experience with computerized systems would be helpful, if shared.

NOIS staff would profit from any assistance received in the early stages of initiating this program that would bring together such materials, evaluative and otherwise, regarding the design, performance, costs, utilization and acceptance of computerized Career Guidance systems which would be helpful to the state directors of these systems in resolving their "marketing" problems.

And it could prove of real benefit to the Foundation to fund some relatively small experimental projects in connection with NOIS. As examples, grantee states having heavy concentrations of workers in science and technology-based occupations could be given some assistance in developing local information about these occupations. Or, in grantee states where it was appropriate and feasible to do so, the consortia responsible for these projects might be persuaded to evaluate the impact of their systems upon the career exploration and career planning of science students in those secondary schools where the systems are operative.

31. That the Foundation, taking its cue from the mixed reactions of commercial publishers respecting the production of Career Guidance materials for special student populations, including young women and members of ethnic minorities or economically disadvantaged groups, assess the need that may exist for specially prepared guidance materials for these users, or for sections of such materials oriented to special groups in those designed for general circulation. Special efforts to gather and present data about occupations in science and technology, tailored to appeal to special groups both in content and format may be in order, and might be produced if their publication were sparked by Foundationa encouragement and support.

32. That the Foundation look into the circulation practices of the professional societies producing guidance materials about occupations in science, mathematics, and technology and into their receipt and use in the secondary schools.

    Better methods of advising school counselors of the availability of these invaluable materials are quite probably required. A number of the societies' representatives suggested some form of clearing house or centralized communication system that would inform students about the availability of their materials. In turn, the societies should be informed that the state employment security agencies and the NOIS systems could be important users of these materials and should be included in their circulation lists.

Finally, there is a recommendation we believe should be made though it does not fit neatly into any of the categories appearing above, it is:

33. That the National Science Foundation support research designed to disclose those negative attitudes that sometimes appear to exist in the counseling profession towards occupations in science and technology, the extent to which such attitudes exist, and the factual data that can be developed to refute the assumptions upon which they are based.

Conclusion

In this final chapter of our study we noted what was described as "the background to the problems and issues" towards whose resolution our several recommendations are directed. This background is one that we see as a lack of "system" in the production and dissemination of occupational information and a lack of empirical evidence with which to resolve the competing claims made for various theories of career development and counseling practices.

No doubt our views respecting this background have colored the formulation of our several recommendations. This is particularly evident in our emphasis upon the Foundation's coordinating its efforts to improve the Career Guidance provided future science majors with the more general efforts of other agencies to improve all Career Guidance. It is also evident in our recommendations to determine with greater exactness than has ever been done the present status of Career Guidance, as well as to gather whatever empirical data can be collected to substantiate or refute the theoretical bases of prevalent and emerging guidance practices.

It is our hope that a least some of these recommendations, derived largely from respondents we have interviewed and questionnaired, but with which we are in thorough agreement, may be tried and not found wanting in their capability of improving the Career Guidance provided to future science majors.

REFERENCES--CHAPTER IX

(1) Jones, G.B.; Helliwell, C.B. and Ganschow, L.H., "A Planning Model for Career Guidance", *Vocational Guidance Quarterly*, Vol. 23, No. 3, March 1975, page 221.

(2) Our study indicates, in a general way, what has been done and is now available by way of Career Guidance materials in the sciences. Descriptions of the *Occupational Outlook Handbook*, state-produced *Occupational Guides* and *Briefs*, the materials produced by professional societies and commercial publishers are covered with reference to their use both for all secondary school students and for those in the sciences. Such bibliographies as that produced by the Scientific Manpower Commission of the AAAS, *Science and Engineering Careers*, 1974 and the NVGA's *Bibliography, Current Career Information*, 1973 among others give detailed listings of the occupations in science and technology covered by published materials.

Nonetheless, a more thorough study is required to produce a complete listing of publications (and possibly of audio-visual materials) accompanied by evaluations of their content and of their usefulness to science students at the secondary school level. Our recommendations addresses the need for a thorough study of the above type. If the need, sometimes expressed in the course of our study for a "clearing-house of materials on science occupations", is ever to be filled such a study would have to precede its establishment.

APPENDIX - CHAPTER III

Note: The following tables have been constructed from data collected by Dale J. Prediger, John D. Roth, and Richard J. Noeth in a nationwide study of 32,000 8th, 9th and 11th graders in 200 participating schools as summarized in "Nationwide Study of Student Career Development: Summary of Results" (ACT Research Report No. 61) American College Testing Program, Iowa City, Iowa, 1973.

Table 1

STUDENT PERCEIVED NEEDS FOR HELP

Area of Concern	Grade 11 "Yes" Responses			Grade 8 "Yes" Responses		
	%T	%M	%F	%T	%M	%F
Making career plans	78	76	80	73	71	75
Finding after-school or summer work	67	64	70	73	72	73
Improving study skills	65	68	61	73	74	72
Improving math skills	60	63	58	73	71	74
Improving reading skills	58	61	56	63	65	60
Choosing courses	58	57	58	64	62	66
Obtaining money to continue education after high school	56	56	55	57	57	57
Discussing personal concerns	30	29	32	39	38	40
Discussing health problems	15	17	13	29	31	26

Source: Derived from Table 4, p. 9 of above study

Directions to students for answering these questions were as follows: "The list below covers several things with which students would sometimes like help. If you would like help with any of these things, mark A for Yes. Otherwise, mark B for NO."

Below is a summary of student responses to the paraphrased question, "Overall, how much help with career (educational and job) planning has your school (teachers, counselors, principal, librarian, etc.) given you?"

Table 2

GENERAL REACTIONS TO SCHOOL GUIDANCE SERVICES

	Grade 11			Grade 8		
	%T	%M	%F	%T	%M	%F
None	17	20	15	24	25	24
Little	32	33	32	31	31	20
Some	37	36	39	33	33	34
A lot	13	11	15	12	12	12

Source: Table 5, p. 10 of above study

Note: The following tables summarize data collected for the study by Margaret Thal-Larsen and Phiroze Nagarvala, A Survey of High School Students Needs for Labor Market Information in Career Decision-Making, Human Factors in Technology Research Group, Department of Industrial Engineering, University of California, Berkeley, 1971.

Table 1

CONTENT OF MOST-WANTED CAREER INFORMATION

Content Number of Students: 162	Percent of Students Most want to know	One of 4 items want to know
Training and education needed	44.4	76.5
Kind of life associated with job	17.3	58.0
Skills and interests needed	9.3	54.3
Wages and salary of job	8.6	60.5
Future labor demand for job	6.8	35.8
Duties of job	5.6	31.5
Jobs where one can help people	4.3	21.6
Location of jobs	2.5	29.6
Promotional opportunities	1.2	19.1
Other		1.9

The students were asked to indicate their first choice among the above items (shown in the first column) and then to indicate their second, third and fourth choices. These, together with first choices, are combined in the second column and shown as the percent of all students selecting the item as one of four choices.

Table 2

WAYS OF OBTAINING CAREER INFORMATION

Ways Number of Students: 159	Percent of Students Most favored way	 One of 3 favored ways
Visiting places where the jobs are and seeing the work performed	42.8	78.6
Working part-time in summer	22.6	60.4
Talks with counselor	11.9	25.2
Telephoning career information center	7.5	21.4
Reading about jobs in books or pamphlets	5.0	25.8
Work experience course	2.5	22.0
Visiting a career center at school	1.9	18.2
By teachers in "world of work course"	1.9	15.1
Films, film strips, or TV about jobs	1.9	11.9
Talking to employers	1.3	2.5
Extra-curricular activities	0.7	12.6

The students were asked to indicate their first choice among the above items (shown in the first column) and then to indicate their second and third choices. These, together with first choices, are combined in the second column and shown as the percent of all students selecting the item as one of three choices.

Note: The following tables summarize data collected for the study by Barbara A. Kirk, Factors Affecting Young Women's Direction Toward Science, Technology, Mathematics, Management Technology, Career Projects, Berkeley, California, 1975.

Table 1

CONTENT OF MOST-WANTED CAREER INFORMATION

Content	Percent of Young Women	
Number of Young Women: 493	Most want to know	One of 4 items want to know
Kind of life a person is likely to have	28.0	68.1
Education & training needed for jobs	22.5	66.5
Skills & interests needed in jobs	19.3	58.4
Kinds of jobs likely to be plentiful or hard to find in the future	13.2	52.9
Duties of various jobs	5.9	33.9
People with whom working	5.1	34.7
Location of jobs	2.2	26.9
Wages or salary paid on job	2.0	39.0
Chances for promotion	0.6	12.1
Other important information	1.2	2.4

The young women (all scoring at or above the 80th percentile nationally in the quantitative section of the PSAT were asked, "If you could find out anything you wanted to know about jobs or careers, what do you most want to know." They were requested to show their first choice, followed by second, third and fourth choice, all of which are combined in the second column and shown as the percent of all students selecting the items as one of four choices.

Table 2

WAYS OF OBTAINING CAREER INFORMATION

Ways	Percent of Young Women	
Number of Young Women: 497	Most favored way	One of 3 favored ways
Actually seeing work performed	28.4	67.4
Working part time or in vacation	23.7	51.6
Through people in occupation	19.9	69.1
Engage in job related activities	13.7	48.8
Through talks with counselor	4.0	9.8
In content of regular courses	2.6	9.2
Through attending a "career day"	2.4	10.4
By reading about jobs in books or pamphlets	2.0	9.6
Through parents or relatives	1.2	5.8
In "world of work courses"	1.0	6.0
Through talks with teacher	0.4	6.4
By watching movies, film strips, etc.	0.6	2.6
Other ways		1.2

The young women were asked, "In obtaining information about jobs or careers, how would you most like to get this information?" They were requested to show their first choice, followed by second and third choices, all of which are combined in the second column and shown as the percent of all students selecting the item as one of three choices.

Table 3

ITEMS MOST INFLUENCING THINKING ABOUT CAREER CHOICE

Influence Number of Young Women: 483	Percent of Young Women Most important influence	 One of 4 most important influences
Own interests	66.7	98.3
Own abilities	11.8	67.1
Courses	3.3	31.9
Activities	3.7	31.9
Knowing someone in the occupation	2.9	24.4
Own work experience	2.7	22.6
Books and pamphlets about occupations	0.4	16.5
Mother	1.2	15.5
Financial considerations	0.8	15.5
Father	2.3	13.9
Teachers	1.7	11.6
Relatives	0.6	11.6
Grades	0.2	10.1
Peers	0.4	0.7
Movies or TV programs	0.6	0.6
Physical Capacity	0.4	0.5
Counselors	0.2	0.4

The students were asked to "rank in the order of their importance to you those four items below which have most influenced you in your thinking about a career choice." Most important influences are shown in the first column. These combined with second, third and fourth ranking influences are combined in the second column and shown as the percent of all students ranking the item as one of four selections.

APPENDIX - CHAPTER IV

Man-Technology: Career Projects
2150 Shattuck Avenue, Suite 903
Berkeley, California 94704

Working Paper
NSF Grant No. EPP-74-20284
April 1975

RETURNS FROM STATE SCHOOL OFFICIALS' QUESTIONNAIRE

A major goal of the Career Guidance study is to identify those components of guidance systems that are particularly effective in counseling secondary school students interested in pursuing careers in science and technology -- a subject receiving little if any attention in the literature. Hence, recourse to those likely to have an overview of actual counseling practices appeared an appropriate action to take at the outset of this project.

Further, an instruction early received from NSF concerning the conduct of this study was that our research "should be broadened" . . . to give "an overview of current practices in Career Guidance all the way from the school with no guidance counselor to the sophisticated computer-based systems." This instruction poses at least some quantitative implications as to the prevalence of certain practices throughout the country.

The advice we received from authorities in guidance however, was that we would find no such quantitative judgments in published form. Also, our own experience indicated that state-level school officials are poor sources for obtaining quantitative distributions of practices in their respective states. They are handicapped in this regard because of the autonomy and diversity of local school districts and, in many states, the varying degrees of authority even among county school departments. But our obtaining the picture we sought with statistical accuracy did not appear critical to the success of the project, nor would project resources support such an approach. Thus, we ruled out efforts to design a representative sample of secondary school guidance departments on a national basis in order to quantify the incidence of various practices -- for example, group as against individual counseling, or time spent on vocational counseling as compared with personal counseling, or whatever.

The notion was tempting, however, to undertake a trial effort to determine by means of a questionnaire just what guidance practices were "most prevalent" in the various states and what were the "less prevalent" practices. We discussed the matter with the Chief of Pupil Personnel Services of one state who encouraged us to try this approach and who offered various suggestions for the questionnaire's design. At the same time, however, we were cautioned that in this very state, school officials would most likely be unable to complete this type of document, and this proved an accurate prediction.

Of the fifty questionnaires sent out,* only 50 percent were completed. Some of those responding commented on the difficulty of their answering certain questions because of their lack of an accurate statewide overview of guidance practices. Others replied that they were not answering our inquiries for the same reason. We therefore, did not follow the usual procedure of sending a subsequent letter in order to increase the response rate but settled for what we had obtained on the first try. The fact that so many were unable to reply provides significant insights in itself.

---

*The questionnaires were mailed on November 29, 1974.

We will not be able to use the results of this survey in any context that would imply its "representativeness" as to the frequency of various organizational modes and practices. However, considered as case studies the replies returned do provide insights as to changing trends in guidance. They also document the opinions of the respondents respecting various issues and problems, as well as their suggestions for improving the conduct of Career Guidance.

For reasons of protocol, our questionnaire was addressed to the Superintendent (or other equivalent title) of the 50 state school systems. We suggested that the document then be relayed to the appropriate official for completion. Thus, those that were returned came from such administrators as State Superintendents or Directors of Guidance, "Guidance Consultants", Directors of Pupil Personnel Services and Directors of Vocational Education (or Vocational Guidance).

The format of our questionnaire rested upon the assumption that the school officials completing it could supply at least a rough characterization of the organization and practices of Career Guidance in their public school systems in the following terms:

> First, that they could give an approximation of the organization and practices characteristic of guidance in those schools in which a majority of their secondary school students were enrolled.
>
> Second, that they could furnish a less extensive description of guidance in those schools in which more or fewer guidance services were supplied than in the pattern characterized as "most prevalent".

Career Guidance in schools providing more services was categorized as "more developed" in that these schools might have greater resources for guidance, have the capability of better delivering guidance services, or, in general, provide a higher level of services than in the most prevalent pattern. Career Guidance in schools furnishing fewer services was categorized as "less developed" in that these schools might have fewer resources for guidance, have a lesser capability of delivering services or, in general, provide a lower level of services than in the pattern characterized as most prevalent.

The returns from our questionnaire when combined, therefore, do permit the construction of more or less representative portraits of the theories, practices and circumstances characterizing the most prevalent pattern of Career Guidance across a wide stretch of this country as well as equivalent information about the more developed and less developed patterns that are also operative. We also requested responses on such subjects as the Career Guidance given under these three patterns to students with strong capabilities for entering careers in science, mathematics, and technology; for the officials' evaluations of their states' current guidance programs; and for information about the nature of the school systems' relationships with government agencies and private organizations which were designed to initiate or expedite the production and delivery of career information to secondary school students.

In broad terms, the twenty-five questionnaires that were returned represent a fair sampling of the states by size and geographic region. A more than usual diversity of practices throughout the state appeared a chief reason for nonresponse.

1. Most Prevalent Pattern of Career Guidance

If we were to construct a "thumbnail sketch" of the most prevalent pattern of Career Guidance within the twenty-five states participating in our survey, we should have to conclude that a two-to-three counselor high school is the norm. However, the activities of professionally qualified counselors are generally supplemented by those of the Work Coordinator and by teachers, particularly the Vocational Education teacher. A variety of other in-school specialists more infrequently participate in guidance. It can be no surprise to find that student/counselor ratios often exceed the accepted standard of 350/1.

Overwhelmingly, in this more prevalent pattern, guidance staff rely on publications of the Department of Labor, primarily the Occupational Outlook Handbook (21), and of such commercial houses as Chronical Guidance, SRA, Doubleday, Ferguson (18) for their occupational information. About a third (8) of the respondents mentioned utilizing state and local materials and a miniscule number (2) mentioned the output of professional societies.

As to the most frequently used publications about educational and training opportunities, twelve of the twenty-five respondents mentioned general resource materials regarding college-going such as ACT, College Board, Blue Book, Ferguson, etc., while ten referred to materials produced by their state information systems. Lesser numbers mentioned college, university and vocational school catalogues and directories or apprenticeship directories, Department of Labor publications or VIEW. These materials are generally housed in the counselor's office and the school library(17). However, also mentioned at this point was the growing trend towards Career Guidance Centers (within the school), the use of audio-visual materials, and the incorporation of career information within the curriculum as means of disseminating knowledge of occupations and of educational requirements.

Twenty-four respondents replied to a question concerning the information and records about students that is customarily available to and utilized by counselors. Mentioned were accumulated permanent record forms including grades (17), aptitude tests (17), interest tests and inventories (15), achievement tests (14), and anecdotal records including interviews with students (5). Comments indicated that the "whole matter of tests" appears to be pending for legislative action in some of the states. In this connection, only ten officials reported that one or more tests were required statewide. There were seven statements that no tests are required statewide while five wrote that although no tests are required, some are recommended or most used.

In answer to a specific question on the subject, the large majority (17) of the respondents stated that Career Guidance Centers are becoming a part of the counseling system in their states' most prevalent pattern of Career Guidance. In thirteen instances these centers were described as located within the individual high school. In the remainder, they are located both within the schools and at regional centers, or they have been set up in a district or regional center serving several schools.

About half of those centers located within the high schools were described as little more than library operations, while the remainder were said to be equipped with microfiche, tapes, sound cassettes and the like. Center activities were characterized, mainly, as related to the dissemination of career information although counseling workshop sessions could also be among their activities.

A more general question about the special techniques employed in delivering career information found one-third (8) of the respondents associating the use of visual aids, VIEW decks, films and film strips with counseling as practiced in the most prevalent pattern of Career Guidance. An equal number referred to the incorporation of occupational information in the curriculum in addition to the use of visual aids. A few (3) spoke of some computerization of the occupational information available to some of their secondary school students. The remainder were silent as to the use of special delivery techniques.

According to the largest number of respondents (8), "no particular theories" appear to underlie counseling practices in these most prevalent systems. But where a supporting theory was thought to exist, five respondents termed it "developmental" theory. Often, the influence of Career Education concepts and models was stressed in answering our question as to the particular theories of career choice that might underlie the approaches to Career Guidance practices customarily followed in the most prevalent patterns of guidance. A very few respondents (4) were more specific, giving such names as Super, Holland, and Ginzberg as responsible, at least in part, for the theoretical underpinnings of the Career Guidance provided in their schools. References to trait-factor or behavioral theory were very few and when they were made, it was generally to state that these theories were giving way to developmental theory.

In the most prevalent pattern of guidance, more often than not (15) the gifted student (including the student with strong capabilities for entering occupations in science, mathematics or technology) fails to receive special career attention. And when he does receive such attention it may be that this concern is expressed in no more concrete fashion than that "the gifted student is given assurance that he is not ignored because he is doing well." However, ten respondents did describe more specifically the attention that might be given to students with strong capabilities for entering careers in science, mathematics, or technology.

The largest number (4) maintained that such students would automatically receive more career attention than others because "traditionally they get more help." College and employer representatives appear at the high schools; special materials concerning these occupations are in the resource centers; there are many jobs in these fields to attract the interest of such students. Almost as many respondents (3) equated this special attention with various forms of special courses -- advanced courses in mathematics and science, intern programs, advanced placement and "mini-courses". Two school officials replied that these students are still receiving the special attention that was created for them under the provisions of the NDEA while one believed that because of their many talents and interests these students (likely to have real decision-making problems) will receive more attention because they seek it out.

The largest number of respondents (12) maintained that schools with the most prevalent pattern of Career Guidance are to be found "throughout the state". Others (4) located them in small to medium-sized cities while an equal number specified that they are generally in medium to large-sized cities. The remainder (2) reported their location most likely to be in suburbia.

2. More Developed Patterns of Career Guidance

It should be of some interest that what were described as the "more developed" systems of Career Guidance are not necessarily, nor even most often, characterized as those possessing more resources, lower student/counselor ratios, better trained counselors or more elaborate facilities than are to be found in the most prevalent systems. The model of the more developed system that emerges (one which apparently serves our respondents as a criterion of the "good" system) is the system where guidance programs display a high degree of coordination between guidance and curricular offerings. Career Education concepts and modes are much stressed with strong emphasis upon such features as teachers "serving as the front-line guidance resource"; a heavy involvement with community resources including opportunities for exploratory work experiences; career centers, and possibly such added items as the provision of a school-administered placement service, a Career Guidance Curriculum Coordinator, and a higher than average use of computer facilities and audio-visual media.

In the more developed systems, gifted students, including those oriented towards science careers, would appear to enjoy a thin advantage as to special career attention over the students receiving guidance in the majority of schools. In the unlikely event that such attention is given, it is said to result from the fact that "guidance, in general, is college-oriented, reflecting the academic bias of counselors." To the extent, also, that special attention is given, it would take the form of the provision of an advanced curriculum, intern programs, or advanced placement. Very seldom would it follow the Career Education model of job exploration for the gifted.

As was true of responses regarding the geographic location of schools having guidance services of the most prevalent type, the largest number (6) again located their more developed category throughout the state. However, the remainder split about evenly between placing the latter in large cities or in suburban areas, with only two respondents reporting these more developed systems to be located most often in medium or moderate-sized cities.

3. Less Developed Patterns of Career Guidance

The less developed patterns of Career Guidance were usually described as systems characterized by a lack of resources that manifests itself in limited personnel and time for guidance, high student/counselor ratios, poorly trained counselors and very few support services. Those respondents who went on to elaborate upon what follows from this generally lower level of sustained benefits and less reliable delivery systems often edged nearer to their criterion, earlier expressed, of a "good" system. They saw in this less developed pattern little or no use of Career Education concepts. Thus, there is likely to be no integration of guidance in the curriculum, few opportunities for structured work experience, and few career centers.

As to the special career attention that might be given science-oriented students in this less developed pattern of guidance, a majority (13) of the reporting respondents believed that it would not be provided. Six of the eight who thought such help would be forthcoming spelled out why they surmised it would be available. Some maintained that as counselors possess an academic bias, they are likely to provide such students special help. Others pointed out that more resources exist for such students such as specially funded programs. And the remainder stated that special attention is automatically provided to all the college-bound.

The greatest degree of unanimity concerning the geographic location of schools providing a specific mode of counseling was shown, not unexpectedly, in the nineteen replies stating that the less developed category of Career Guidance is generally to be found in the rural areas. A remaining three held that such schools are spread throughout the state while two placed them within the inner cities of highly urbanized areas.

4. Statewide Aspects of Career Guidance

When viewing the guidance activities of their states in general, most of our respondents reported rather strict certification requirements for professionally qualified counselors. However, that part of counselor preparation involving knowledge of "the world of work" appears to be minimal, prompting most respondents to recommend changes. These, generally, involve including internships, "more practical experience", a "practicum component", or "outside work experience" in counselor training.

About half of the respondents were satisfied with the amount and quality of the occupational materials they receive. Where they were not, their criticisms were usually directed to a lack of sufficiently localized publications or to the fact that most materials do not stress students' needs, interests and values. When dissatisfied, they called for more localized, more current, non-racist, non-sexist materials. Some believed there was a need for statewide computerized systems and for data banks. Others, under the banner of Career Education, wanted to establish more Career Guidance Centers and more "action-oriented programs". In fact, more respondents stressed "infusing Career Education into the curriculum" as the best way to improve the delivery of occupational information than recommended extending the use of computerization, data banks or audio-visual aids.

Most respondents spoke of a growing reliance upon community resources in managing their guidance programs, commented favorably upon their relationships with federal and state agencies, and indicated that they were moving towards implementing an agreed-upon Career Guidance model which generally displays strong Career Education aspects.

We did not complete our questionnaire before asking our respondents for their comments as to whether or not they believe that special provisions are needed and should be made for the Career Guidance of gifted students, particularly those with strong capabilities for entering occupations in science, mathematics or technology.

The majority (14) of the twenty-one state school officials answering this question took the position that the guidance system should speak to the needs of all students and be generally adequate. There were several statements to the effect that all students need guidance and that it must reach all students. There were, in fact, some comments that to maintain otherwise or even to ask such a question was to assume an "elitist position".

The seven who believed that special provisions are needed for the guidance of such students represented a rather broad range of thinking on the subject. One respondent took the position that such students should "definitely be included" in efforts to provide adequate guidance to all students, and there was the inference that it would require special provisions to ensure their inclusion. Others resembled in their approach the respondent who wrote that: "The gifted should be a more important part of Career Education." Yet others took a more pedestrian stance. "Counselors need to have more accurate information about employment opportunities for the gifted, as well as better educational information for them." And, finally, there was the respondent who believed that these students should receive special career attention but who commented, "Special attention wouldn't be possible for them now in this state."

* * * * * * * * * * * *

In conclusion, certain points do emerge from the replies to this questionnaire that are relevant to the NSF objective of determining upon which areas of Career Guidance that agency should place its priorities.

As is true of the state employment security agencies that prepare Occupational Guides and other releases used for Career Guidance, the state school officials, as well, place heavy reliance upon the Occupational Outlook Handbook and other publications of the Department of Labor including its employment projections. It would appear that any information that the NSF in cooperation with the BLS could, itself, generate or encourage others to produce concerning occupations in which the latter agency has an interest would have a multiplier effect if deemed appropriate for Handbook use.

About one half of the school officials expressed satisfaction with the career information they receive. However, the others, who did not, frequently deplored the lack of sound local information. Hence, any help that could be supplied through NSF channels to open up new data sources for the production of accurate occupational and educational information concerning jobs in science, mathematics and technology, particularly for emerging occupations, should be directed to improving state and local as well as national data sources.

The small mention made by school officials of the career information produced by professional societies may or may not be indicative of the actual use made in the schools of these publications. It would seem worthwhile, however, to look into the circulation practices of the societies producing career materials on occupations in science, mathematics and technology and to check into their receipt and use by the schools. Better methods of advising school counselors of the availability of these materials are quite probably required.

Scattered comments throughout the questionnaire regarding computerized records management and the computerized delivery of career information would speak for continued NSF support of research, experimentation, and evaluation in these areas. To be sure there was some voicing among these comments of sentiment that "computerized guidance is inhuman." However, our respondents were more likely to equate the use of mechanical assists and visual aids with the "more developed" Career Guidance systems than to disparage the assistance which these products of modern technology can provide to the human counselor.

There were, in fact, two general areas about evenly mentioned by the state school officials when they were asked their opinions concerning needed changes in present methods of storing, retrieving and delivering Occupational Information. One group, as indicated above, desired to extend the use of computerization, data banks and audio-visual aids -- all of which assists would seemingly fall within areas of NSF expertise and interest. The other group emphasized Career Education concepts and maintained that occupational information is best delivered by "infusing Career Education into the curriculum, using teachers as the delivery agents." This latter view should be taken into account in NSF efforts to improve science education, for Career Education is unquestionably a current enthusiasm among educators but its application to higher level occupations appears to be lagging.

Finally there appear to be less than favorable attitudes towards occupations in science and technology in various quarters of the counseling profession. These attitudes stem from such assumptions as that giving the specialized career attention that may be required by students having strong capabilities for entering careers in these fields runs counter to a proper egalitarian philosophy, or that the future labor market for this personnel is to uncertain to warrant the long training time required for entry. The merits should be considered of supporting research of a kind that would disclose the extent of such attitudes and determine the factual data which could be developed to refute the assumptions upon which they are based.

Man-Technology: Career Projects
2150 Shattuck Avenue, Suite 903
Berkeley, California 94704

Working Paper
NSF Grant No. EPP-74-20284
March 1975

RETURNS FROM STATE EMPLOYMENT SECURITY AGENCY RESEARCH CHIEFS' QUESTIONNAIRE

One objective of the Career Guidance study is to explore and describe the Occupational Information utilized in various guidance systems. As employment security agencies across the nation are among the major producers of this information, we contacted the research chiefs of these agencies at the end of November 1974 concerning the status of their programs.

Ninety percent or forty-five of the state chiefs responded with completed questionnaires. The five non respondents included one who pleaded lack of time to complete the schedule. The remainder replied that their present operations were in too great a flux because of reorganizations and the like to supply valid descriptions of them, or that they were awaiting the results of their applications for NOIS* grants which, if received, would totally change their programs. These non respondents said that, if asked, they would supply needed information at a later data, a request that we have not made of them. The states from which replies were not received were of medium or small-sized population and they were not concentrated in any particular geographic region.

The questionnaire was oriented towards obtaining a picture of the state agencies' Occupational Information output, the program areas where the research chiefs were experiencing difficulties, and their suggestions as to needed actions to alleviate these difficulties.

A summary of their replies follows:

1. Output of Occupational Information: Occupational Guides

Data forwarded from the state agencies indicate that not as many states (23 or less than half) are currently issuing Occupational Guides as we had been led to believe. Circulation figures were relatively high in some states with as many as 8,000 copies per occupation distributed in the original mailing which might include single-copy distribution to as many as 2,000 secondary schools. Most circulation figures, however, were considerably lower, with initial issues around 1,000 copies to fewer than 200 secondary schools. Only eleven out of the twenty-three states reporting a Guide program had covered 100 or more occupations with these publications. Judging by the sample copies sent by some respondents, our figures for Guides include publications that can best be characterized as "Mini-Guides" or Job Briefs as well as more ambitious productions.

---

*National Occupational Information Service of the United States Department of Labor.

Whether or not the Guides were lengthy or brief, virtually all included the same subject matter. All respondents mentioned sections on job duties and entrance requirements. Almost all mentioned wages and employment outlook. Those where, presumably, the publication was more oriented to supplying job than career information, stressed where and how to find the job. And those more oriented towards career information mentioned the education and training required, promotional opportunities, related jobs and additional sources of information.

The great majority of respondents with Guide programs (18) were issuing descriptions characterizing occupations, statewide, and about half of them stated that their releases were prepared largely or entirely at the state level. Almost all were experiencing difficulties with revision schedules. Only four states reported revising their Guides approximately every two years or more often. The remainder replied, "approximately every three years," "every four years", "every five years or longer", or "when time permits". At the same time, very few states reported issuing Guides for a first time on any occupation during the preceding year.

About half of the respondents described the current status of their programs as on a limited basis because of a lack of resources, or that these programs were undergoing reexamination to the end of stabilizing output in line with resources. The remainder did not reply to the question, or they characterized the "present status" as "currently budgeted and active", or they reported that they were beginning a new program.

As to the future, the majority (16) hoped to devote more work to the program if necessary resources were available, or planned to continue their present production under the same circumstances. Respondents from three states with no program at present hoped to institute one if they were funded to do so.

All respondents mentioned a heavy reliance on the Occupational Outlook Handbook and the Dictionary of Occupations as sources for the descriptive information contained in their Guides. Far fewer mentioned recourse to employer surveys or individual employer contacts (except for wage information), ES administrators and personnel, job bank or ESARS data, or contacts with other organizations and individuals.

Asked concerning their "principal problems" in preparing descriptive information about occupations, the most frequently mentioned difficulty (5) amounted to some variant of the theme that the methods used to gather and prepare this information are "too mechanical", "too general". In addition, complaints about the lack of staff resources for the program (4) were generally coupled with the observation that this lack prevented giving sufficient attention to the local differences which existed in many occupations. Computer time or support was mentioned as a problem by some respondents (4), the lack of the program's priority by others (3) and the fact that the state fails to have "a good data collection system" by yet others (2). Additional problems mentioned by one or two respondents included a lack of library resources, the long distances between interviewers and establishments under study, the problem of establishing credibility when employer information is not collected or is ignored, problems of code reconciliation, and the difficulties of identifying the data needs of primary users.

When asked what steps that could be regarded as feasible and cost effective should be taken to remedy the problems they were describing, the largest number (8) said they had no remedies to suggest or that they knew of none that would be feasible. Some (4) said that better methods should be developed in order to produce more detailed, more localized information. Others (2) saw a need for an adequately supported system and for giving a higher priority to this system than is currently enjoyed by any Occupational Information program. Otherwise, there was a smattering of various suggestions -- more highly trained staff; better cooperation from employers; resolving current confusions about occupational terminology and codes; better communication with data users; and expanding the OES* to all states.

We asked certain questions relating to the production of descriptive information concerning occupations in science and technology.

Replies to these questions showed that most of the state research chiefs did not, in general, regard the problems associated with describing these occupations as substantially more serious than the difficulties attending the preparation of information on non-science occupations. Where specific problems were mentioned, they related to the inadequacy of Employment Service data respecting these occupations as such workers are not commonly served in the local offices; the current policy of concentrating *Guide* preparation on less demanding jobs at the expense of higher level jobs; or the difficulty of relating academic specialization to specific industries and occupations.

2. Output of Occupational Information: Projections

Responses to our questionnaire indicated more activity, currently, in releasing occupational employment projections that are used for Career Guidance in the secondary schools than was reported in connection with descriptive materials such as *Guides* and *Briefs*. Various assists from the Bureau of Labor Statistics, the Manpower Administration and the Bureau of the Census have enabled the large majority of the states, many in the recent past, to issue occupational projections that are available to the secondary schools in various forms.

Of the forty-five respondents, thirty-nine answered affirmatively that they had already released such projections or that such releases were in preparation. Five had not prepared such information and one had released projections, but only for major occupational groups.

There appeared to be little uniformity, however, in the time spans covered by their published projections, the geographic areas included, or the methodologies employed in their construction.

---

*Occupational Employment Statistics program.

Nineteen states were preparing ten year projections, eight constructed them for five years, and seven covered both a ten and a five year time span. Five added shorter time periods to their longer projections or prepared only short term forecasts. Fourteen respondents stated they were planning to revise these projections every two or three years; twelve planned to revise them annually, and the remainder had established no schedules for revision or expected to revise less frequently or "when needed".

The level of geographic detail (except for 4 respondents where no statewide projections were mentioned) was most often (21) statewide and major metropolitan areas or only statewide (8). The remainder covered not only the state but also such other areas as "economic regions" or manpower planning areas and, possibly, SMSA's.

Most agencies released their projections in pamphlet form with at least some narrative describing trends and/or the methodology underlying the projections. A few (5) accompanied their projections with job information on individual occupations, while others (5) released only tabulations. In a few instances, projections were transmitted only in memorandum form or in reports to state school officials.

In thirty-four instances, projections were prepared at the state level with or without assistance from BLS or MA personnel. In the remaining cases, local analysts participated in the area forecasts either preparing them initially for later state review, or reviewing the projections after they were constructed by the state office.

In describing the "current status" of their programs as "established", only five respondents qualified this descriptor as "established but with many resource problems". And these same five mentioned being uncertain as to future plans until their problem of resources was resolved. Most of the respondents were looking forward to extending their programs in terms of adding new areas, covering more occupations, including narrative with their statistical output, or simply "putting more work" on the program.

A broad variety of sources was mentioned as used in preparing occupational forecasts. Listed most frequently (20 or more mentions) were the industry-occupational matrix, CES, ES202, historical trends and census materials. Less frequently noted in answer to this particular question directed to sources, was specific mention of the OES program (8) local office and area analysts; current ES data (8), the Interim Manpower Projections Program (7) or contacts with employers, unions, and other organizations (4).

However, when the respondents were asked to what extent they had been able to incorporate (or did they plan to incorporate) OES data into a system of occupational projections, five said that they would incorporate these data when OES is operational. Eight had already utilized these data in their projections and four cooperating states, although they found the information useful, were not as yet utilizing it in connection with their programs. A remaining four respondents were working on incorporating these data in their programs but were experiencing various difficulties such as "coordinating OES with such other programs as LBL".

Overwhelmingly (35 to 7) respondents answered negatively as to the existence in connection with their projections of

> *. . . a program of state and/or regional or local area research designed to validate through employer and other contacts your occupational projections or the industry projections upon which these rest.*

In the few cases where claims were laid to such research the answers indicated that it was OES or the agency's employer relations activities that were regarded as "a program of local validation".

In listing their principal problems respecting the preparation of occupational projections, the research chiefs (14) most often mentioned a lack of resources, of staff, of time, and of program priority. Nine referred to the lack of an adequate data base, particularly for small areas. Less frequently mentioned were such problems as computer difficulties (3), code reconciliation difficulties (3), the general problems of economic prediction (3), training users in the use of these data, and time lags in receiving national data. (When asked specifically, however, if the translation of census occupational codes into DOT or Vocational Education codes was regarded as a serious problem, twenty-seven answered affirmatively and twelve negatively.)

As to the steps that might be taken to ameliorate or resolve the problems our respondents reported, there were six mentions that more resources, more staff, and a higher priority for the program was required at national and state levels. Five asked for more work by BLS on the problem of small area projections and techniques. Four could suggest no remedies that they regarded as feasible and cost effective. Three wanted sample surveys at the local level; three wished to have the OES program in their states, three believed that standard cross references were needed to resolve coding problems. Individual mention was made of training users in the use of the data, channeling all Occupational Information efforts into one program, and doing more work on estimating supply.

In answer to our question concerning difficulties specifically related to making projections for occupations in science and technology, nineteen respondents stated that there were no special problems in this connection. However, five said that there were specific lacks of knowledge of the industries employing these workers and four complained of their limited data input from federal establishments in aerospace and defense. Again it was mentioned that these occupations are not prominent in Employment Service operations. Taken together, several respondents referred to difficulties in obtaining information about the federal contracts picture; the fact that use of census data precludes obtaining information on new and emerging occupations; and that it is particularly difficult to develop occupational change factors for these occupations at the state level.

3. Output of Occupational Information: Other

We also asked the research chiefs concerning their release of information other than Occupational Guides or emloyment projections for individual occupations that was, in turn, utilized for Career Guidance in the secondary schools of their states.

Thirty replied that they were releasing other information (or information in other formats) that was used for this purpose. Twenty-two mentioned such other releases as reports on job openings, surplus occupations or licensed occupat[illegible]s. Seventeen mentioned giving out occupational information in their annual Manpower Report, while fifteen referred to the annual Vocational Education Report and eight stated that they issued interim or special manpower projections whose content might contain information on "number to train".

An inquiry relating to the release of Occupational Information to recipients for use in preparing audio visual materials, brochures, or computerized guidance system software brought sixteen affirmative answers and twenty-five negatives. Most information for such uses was given to school system personnel although there were references to professional societies, research organizations and the CVIS and VIEW guidance systems. In the main, the information supplied was "Guide-type" in content and consisted primarily of data about demand/supply relationships.

4. Relationship of the State Agency to Other Organizations

Twenty-four of the research chiefs replied that their agencies had specifically assigned one or more of its employees to maintain liaison with state or district school officials in connection with Career Guidance in the secondary schools. Nineteen replied in the negative and two referred to informal relationships that bordered on the official.

The principal services provided to the schools were furnishing publications, materials and technical help. In some instances Employment Service personnel gave talks to school people, lent them staff, helped in Career Days, served on committees, trained school staff in the use of Employment Service materials, and assisted the schools in conducting surveys.

Problems listed in maintaining liaison with the schools were various. Mentioned were a lack of resources to achieve continuing communication; the difficulty of reconciling OE and DOL codes; the problem of constructing a sufficiently current picture of local labor demand, and a need for more coordination between top-level Employment Service and school personnel as to the production and dissemination of information to the secondary schools (including working out the problem of incompatible hardware).

Few remedies were suggested for resolving these problems beyond the provision of more resources and achieving a better level of communication.

Only eight respondents mentioned that they were playing much of a role in the Career Guidance Centers now being established in some of the states. However, fifteen reported furnishing some data to large scale Career Guidance systems serving secondary school students. For the most part, the assistance furnished amounted to providing occupational projections, reports of job openings, Guides and other materials. In a very few instances, Employment Service personnel served in an advisory capacity on the governing bodies of these systems or had entered into a consortium arrangement to supply Occupational Information for the system.

* * * * * * * * * * * * * * *

In conclusion, certain points do emerge from the replies to this questionnaire that are relevant to the NSF objective of determining those areas in the many faceted complex of Career Guidance activities where a modest amount of assistance might result in large program gains.

Responses from the state research chiefs present irrefutable evidence that they lean heavily on the output of the BLS national office and in some cases on the assistance of regional office BLS and MA personnel. In fact, the image of an inverted pyramid resting precariously upon its apex emerges clearly from their responses and comments.

So far as Occupational Information of a descriptive type is concerned, the Occupational Outlook Handbook together with the quarterlies is the mainstay of their production of Occupational Information followed by the DOT. Thus, assistance with a potential for producing the largest impact upon the narrative materials utilized in Career Guidance would indubitably be supplied by any support or assistance that could be furnished to the relatively small BLS unit engaged in producing the Handbook.

Zeroing in on the specific objective of supplying students possessing strong capabilities for pursuing careers in science and technology with more accurate Occupational Information would most likely be facilitated by prodding certain installations, both federal and private, to develop more and better data. This could include continuing study of job descriptions, occupational change factors, and expected developments. Coverage under the OES program of government installations employing large numbers of scientific and technical personnel as well as the transportation industry are cases in point. Sponsoring research directed to problems of labor supply, particularly the relationship between certain types of academic specialization and the subsequent employment of the degree holders would assuredly be helpful to those preparing guidance materials.

The preparation of occupational projections raises another image of an inverted pyramid. There, extensive state programs appear to be handicapped by the inadequate resources available to those in the national BLS office who must furnish statistical data and technical assistance to the state agencies within a reasonable time frame.

Not all budget deficiencies, however, are at the national level. A general consensus exists that Career Guidance materials are of maximum effectiveness when local as well as broader considerations are taken into account. Nonetheless, one of the most common complaints of the state research chiefs is their deficiency of resources, both of funds and of technical expertise, to localize occupational projections. Research, possibly conducted by professional societies or academic institutions, concerning the job market for various occupations in science and technology might well be encouraged by the NSF with a proviso that job market differences by locality or at least by state, be identified and described. Further, the state employment security agencies should be noted as important users (and sometimes as sources) of these data.

Such was the enthusiasm of various state chiefs for the NOIS grants program with its potential for improving the dissemination of career information, that it can be strongly recommended that NSF personnel attempt to contribute some input to this venture. A member of the original DOL work group that assisted in formulating the program strongly urged that the highly objective and genuinely expert knowledge of computer systems available to NSF be brought to bear upon the computer problems that will be faced by the states receiving support under this program.

It could also be urged that NSF fund some relatively small experimental projects in connection with the NOIS program. Grantee states having heavy concentrations of scientific workers could be given some assistance in developing local information about these occupations. Or, better yet, in grantee states where it was appropriate to do so, the consortia supervising these projects might be persuaded to evaluate the impact of their systems upon science students in secondary schools.

NOIS staff also need help of a research or literature search type that would bring together such materials, evaluative and otherwise, that would assist them in the "marketing" problems they will face in the early stages of initiating their programs. Too little is known about actual information needs, the comparative efficacy of various delivery media for different user groups, and the infrastructure required for the effective functioning of computerized systems.

Generally speaking, the replies of the state research chiefs afford ample evidence as to why their counterparts in education as well as those designing, operating, or using various of the computerized guidance systems are so mixed in their reactions as to the data provided (or not provided) them by state employment security agencies. The replies of our respondents, indeed, indicate tremendous variance in the amount and kinds of assistance that these agencies are presently able to give to those seeking their help.

APPENDIX - CHAPTER V

Man-Technology: Career Projects
2150 Shattuck Avenue, Suite 903
Berkeley, California 94704

Working Paper
NSF Grant No. EPP-74-20284
May 1975

INTERVIEW REPORT (COUNSELORS) -- "X" HIGH SCHOOL

A. Community Setting

"X" High School students are drawn from that city which had at the census date a population of approximately 4,000.

It is the county seat and this affords some employment in government, trade and professional and related services. The county population was approximately 13,000 in 1970 and in 1974 was estimated at the same figure, indicating a "no growth" county.

It appears to be a stable and self-contained county in other respects as well. About 9 percent work in their county of residence. The proportion of natives of native parentage is comparatively high. The most sizeable "disadvantaged" group are the Spanish-Americans -- estimated up to 20 percent. Although some of these individuals are migrant workers, recent years have seen the farm workers settling in the community.

The county remains strongly agricultural with about one-third of its employment in agriculture, forestry and fisheries while only about five percent work in manufacturing. Comparable percentages for the nation would show the reverse -- 3.5 percent in the former and 24 percent in the latter. Nonetheless, agricultural employment has been falling off in "X" County (prunes, field crops, walnuts and almonds) and its increasingly large farms employ fewer and fewer workers.

B. Characteristics of Student Body

"X" High should reflect the county's ethnic composition. Comparatively high is the proportion of native born. The largest ethnic group of foreign extraction are the Mexican-Americans.

Forty to sixty percent of the high school graduates go on to college. Of these, probably 15 percent get through a four-year college.

Almost all of the students (both boys and girls) have worked part-time and during vacations on farms before going to college. Most have been in the mechanized farm occupations although some have done field work.

The sizeable number dropping out of college then seek jobs. Many out-migrate. Those boys remaining in the community are likely to take on farm equipment work while the girls go to work in clerical and sales jobs or in service occupations.

C. Characteristics of School

School enrollment runs around 550 students. Grades nine through twelve are taught. There are courses under the Regional Occupational Program (ROP) at "X" High (a state program prividing money for a Career Guidance Center at "X" High School which serves three schools).

There are twnety-one teachers at the school. The regular academic program includes courses in science and mathematics. The vocational program includes courses in agriculture, drafting and power mechanics.

No special courses are offered for the gifted at this school and there are no advanced placement courses. If a student with strong capabilities in science or math were to turn up, it can be presumed he would receive some attention from the local colleges. Some colleges have invited "science-oriented students to look over their courses." There is some course work for high school students in the local colleges, but it is not in science.

The special courses offered include those funded under a tri-county ROP. In this program is a hospital and an auto-mechanics course at "X" High. The school in another county has courses under the ROP in heavy agricultural equipment operation and general business, while a third gives training in horticulture and occupations of chef and waitress.

Also under the ROP programs in the three counties is a work experience program. Beginning this year, it will probably be necessary to combine classroom instruction with the work experience which will make the program less flexible than it has been. About seventy-five students are now in the program. Most take about five units work although ten may be taken.

The process of evolution appears to be bringing courses concerned with vocational development back into the curriculum. About fifteen years ago, the social studies curriculum included a "world of work" course which was later dropped. Then, under the impetus of Career Education, the influence of career development was again felt. Now in the ninth grade some information is given on job families (fifteen job clusters). This is followed in the tenth grade by an attempt to relate jobs to interests. Role playing as in job interviews and filling out work applications occurs in the eleventh grade, and information on employment outlook is conveyed in the senior year.

Progress in integrating job information into the general curriculum is being made but not as rapidly as our respondent would wish.

No formal job placement service exists at "X" High. The counselor furnishes as much assistance as possible. The public employment service office is not regarded as of much help to the school's students.

The high school benefits from a high degree of community cooperation. The Rotary and Kiwanis put on an annual Job Fair. Local executives from government and private industry assist the school by coming in and helping in the role-playing and simulations of the job-hunting experience. They also support the cooperative education program and make themselves available for interviews with students who are interested in specific occupations or industries.

D. Characteristics of Counseling Department

The counselor is responsible to the school principal. Supervision appears to be most sympathetic.

She works very closely with the work coordinator and with the teachers.

Clerical help is adequate.

The counselor supervises the para-professional (Guidance Aid) in charge of the Career Guidance Center. This latter is located in a trailer adjacent to the school. The Guidance Aid's background is in social work and there were no rigid specifications for her job. The Center is funded by the ROP.

E. Occupational and Career Guidance Information

The center is equipped with two film strip projectors and one movie projector. There are the usual federal publications (OOH and DOT), state Guides, one SRA subscription, one subscription to "Careers" and much "free literature".

Students arrive as drop-ins or they are scheduled or referred. The facilities are also used for meetings including those organized around the appearance of recruiters for colleges, the armed services, and employers.

The counselor and the center work very closely together and in the opinion of the counselor, she is greatly assisted by the Work Coordinator.

The Student/Counselor ratio would range around 420/1.

The respondent was not able to allocate her time among the various counselor functions. She works from 8:15 a.m. to 5:00 p.m. plus substantial overtime which is devoted mainly to her work on course materials.

She does all scheduling and programming and so sees all students at least once a year for ten to fifteen minute interviews. In addition she may send for students or they may ask for an appointment for a voluntary contact. She has "no problems of enforcing discipline but does see the problem students". She holds special interviews with all graduating seniors, advising them of their grade point averages and discussing their plans with them. She gives the tests to the students but does not score them. In addition she maintains contact with the other two high schools in the area served by "X" High School's Career Center, and her school does some testing for them.

The test schedule is as follows:

9th Grade	Ability Test
10th Grade	KUDER
11th Grade	PSAT
12th Grade	SAT, ACT, ASVAB

This school's Career Guidance may be said to rest upon developmental theory. There is much evidence that Career Education concepts have been put into practice. However, it is probable that this would have occurred in any event and with or without the messages that have come from the state capital and elsewhere.

The respondent was, in general, satisfied with available Career Guidance materials.

These are located in the Career Guidance Center and maintained by the Aid. Audio Visual as well as written materials are available to students on an open basis.

She did not see any necessity for a wider data base of guidance materials than now exists and was satisfied with the present delivery system. There was no enthusiasm, whatever, for computerized delivery.

F. Counseling Practices

As mentioned above, there are no special provisions at this school for the Career Guidance of gifted students including those with strong capabilities for pursuing careers in science, mathematics and technology.

The respondent appeared to believe that the best way to improve the guidance given this group would be to improve that given all students.

The changes which this counselor suggested to improve guidance (in response to a query as to what she would ask for if she could have anything she wanted) were as follows:

> Need teacher in-service training in order to get more career awareness into the curriculum.
>
> There should be more assistance to the students by way of teaching them decision-making skills. This, the counselor saw as a job for teachers or it could be done in group counseling.
>
> Support more classes in vocational training and have more cooperative work experience courses, presumably covering a wider occupational gamut.

Man-Technology: Career Projects
2150 Shattuck Avenue, Suite 903
Berkeley, California 94704

Working Paper
NSF Grant No. EPP-74-20284
November 1975

INTERVIEW REPORT (COUNSELORS) -- "Y" HIGH SCHOOL

A. Community Setting

School "Y" is located in a suburb some twenty-five miles from a large midwestern metropolis. Though largely a suburban residential area, some light industry is included, as well as a major military installation. The population of the area aerved is approximately 45,000.

B. Characteristics of The Student Body

A high proportion of the students come from well-to-do families, with college-educated parents in professional occupations or they are business executives. Nearly half are Jewish. There is a sm all percentage of first-generation children of Italian and Polish-born parents, who are frequently workers in lower income levels. There are also a number of students whose parents are in military service or are civilian employees at the nearby military installation. They are often well-travelled, but generally less affluent and more conservative in outlook than the majority group. Two to three percent of the student body is black; their parents are generally college-educated and affluent. Orientals and Chicanos each comprise two to three percent of the student body; the latter ethnic group is the most disadvantaged in terms of economic status and language facility.

Seventy-seven percent of the 1975 graduates went on to a four-year college or university. Another five percent are enrolled in a two-year college. Only one-half of one percent are attending trade or technical schools. An additional three percent plan further schooling, but have temporarily delayed enrollment. 1975 graduates are attending 158 schools in thirty-seven states and one foreign country.

Of the more than 600 students who took the ACT test in 1974-75, the mean scores were twenty-four for boys and twenty-one for girls. On the SAT, the mean verbal scores were 485 for boys and 465 for girls; the mean math scores were 575 for boys and 490 for girls.

C. Characteristics of the School

School "Y" is a four-year high school (grades nine - twelve) with an enrollment of 2700 in the 1975-76 academic year, and approximately 630 graduating seniors.

There are 158 faculty members. Twenty-eight percent have a B.A., forty percent an M.A., and thirty-two percent have completed graduate study beyond the M.A.

In a curriculum described as "comprehensive and innovative", the school provides the following in addition to the standard secondary school offerings: Child Development, Computer Technology, Drama (acting, directing and technical theater), Ecology, English as a Second Language, Spanish/English Bilingual Program, Man Made World, Philosophy, Psychology, Advanced Behavioral Science, Senior Option, Independent Study, Resource Centers, Special Education, Cooperative Work Training, Distributive Education, Home Economics Related Occupations, Office Occupations and Science Related Occupations. Additional vocational courses are available at a nearby Area Vocational Center. Advanced placement courses are offered at the senior level in the Science, Mathematics, English, Foreign Languages, and Social Studies Departments. In 1974-75, 114 students took advanced placement exams in eight areas.

The school has six Cooperative Education programs, with a total enrollment of nearly 200. The largest is Cooperative Work Training, with seventy students, which provides training in various occupations that require a minimum of skill and technical knowledge. To be eligible, the student must be sixteen years old and have junior class standing.

Industrial Cooperative Education affords training in skilled and semi-skilled industrial and mechanical repair occupations which require considerable skill and technical knowledge. It also is available to juniors who are at least sixteen years of age, and about thirty are now enrolled.

Distributive Education provides training for careers in retailing, wholesaling, transporting, and related distributive occupations. It is open to seniors who have completed a course in Retail Merchandising.

The Office Occupations program includes training for accounting, data processing, secretarial sciences and general office work. It is available to seniors who are enrolled in business courses.

The Home Economics Related Occupations program is a two-year program open to juniors and seniors and covers the areas of child care and guidance, clothing, home furnishing, institutional and home management, and food services.

The Science Related Occupations program is just being initiated in the current academic year, largely because of the personal interest of the Work Experience Coordinator who has an industrial background in biological sciences. It is still in a formative stage.

Additional vocational courses are available at a nearby Area Vocational Center.

Efforts to integrate career information into the curriculum are in the developmental stage. A faculty committee is working on approaches for making teachers knowledgable about career information resources, and on methods for teachers to include career planning in their work with students. The CEEB Deciding program was tried a few years ago, but was dropped because teachers did not know how to use it effectively.

A student placement service is operated under the supervision of the Career Consultant. It is primarily involved with part-time and vacation jobs, but also attempts to place terminal students in full-time employment.

Community cooperation is actively enlisted by the Work Experience Coordinator in support of the several Cooperative Education programs. Representatives of business, industry, government and the professions assist as guest speakers and advisors for a series of "Career Days" held each year. During the last academic year, career days were held for the fields of home economics, foreign language, science and engineering. A week-long "Festival of the Arts" was also presented.

Extensive use is made of parent volunteers, and in the past year about 4500 hours were contributed. Volunteers are used for lectures, tutorial help, and assistance on enrichment projects.

D. Characteristics of the Counseling Department

The Counseling Department consists of the Director of Counseling, nine full-time counselors, a college consultant, a career consultant who is responsible for testing and placement services, and a paraprofessional who is the Coordinator of the Counseling Resource Center. This staff is supplemented by two social workers, a work experience coordinator, a part-time psychologist, and a visiting psychiatric consultant.

The student-counselor ratio is slightly less than 300 to 1. On the average, a student is seen by a counselor six to seven times per year. These are scheduled appointments, usually on the student's initiative. Group guidance sessions are used extensively, principally for college planning. It is estimated that counselor time is allocated equally to three major functions: academic programming, personal problems, and college and future planning. Each of the counselors is assigned students from the four class levels.

The testing program is administered by the Career Consultant. All students are required to take a metropolitan academic achievement test in the tenth grade. Other tests are on a voluntary basis. They are the PSAT, NMSQT, SAT, ACT, Advanced Placement Exams, the ASVAB, and the Strong-Campbell Interest Survey. Fees are charged for all except the ASVAB.

E. Occupational and Career Guidance Information

There is a Counseling Resource Center, occupying a spacious room adjacent to the Counseling Department offices. It appears to be very well supplied. Its bookshelves contain all the appropriate governmental publications, such as the OOH, the DOT, and the OO Quarterly, as well as the products of all the major commercial publishers. There is a comprehensive stock of college catalogues from all parts of the country. File drawers contain brochures and leaflets from professional societies and industries, reprints of magazine and newspaper articles. Two readers are available to use with VIEW decks and other microfilm materials. The Center was in active use by students during our visit.

Films, filmstrips, audio and video tapes, and audio-visual equipment are available in the Instructional Media Center, elsewhere in the building. Students make much more use of printed materials, however, because they are more accessible for random "browsing". To use the audio-visual materials, the student needs to be more specific about what he wants, and make a planned effort to use them.

The school also subscribes to Time Share Corporation's Guidance Information System. A teletypewriter terminal, located in the counseling office, ties in to the school district's computer installation, providing an interactive system for the delivery of national Occupational and Educational Information. Its preponderant use by students is for college information. Usage is well below capacity; records show that only about 200 to 250 students use the system during the academic year. Counselors frequently utilize the system to extract information which they use in group guidance sessions. It is probable that the system does not experience greater use bv students because of the location of the terminal in a counselor's office, making it relatively inaccessible for unaccompanied utilization.

Man-Technology: Career Projects
2150 Shattuck Avenue, Suite 903
Berkeley, California 94704

Working Paper
NSF Grant No. EPP-74-20284
June 1975

CONFERENCE REPORT: VIEW

NATIONAL CONSORTIUM FOR CAREER INFORMATION SERVICES

EL PASO, TEXAS, MAY 28-30, 1975

Attendance at this conference was for the purpose of obtaining an understanding of VIEW as it operates in states throughout the United States. The following is a summary of information gleaned from discussions at the meeting, materials made available on the spot, and informal conversations with individual conferees.

Introduction

VIEW is a system of localized career information, presented on microfiche, for use by students and others as an aid in career planning. Originally developed and pioneered in San Diego, California in 1965, it has been adopted in thirty-five states, with several variations in title. In most states, VIEW means Vital Information for Education and Work. Pennsylvania calls its program Penn-Script; Iowa's is Iowa-Script; Tennessee's is INFOE (Information Needed for Occupational Education); Wisconsin has adopted the acronym WISC (Wisconsin Instant Information System for Students and Counselors); Louisiana uses the name VITAL. Although there is rough commonality of basic methodology and purpose, it is by no means a national system. Each state develops its own materials, and there are many variations in the kind and numbers of occupations covered, the organizational arrangements for administration of the program, and the costs to the local schools.

Organizational Location of VIEW Project

In most states the project is an activity of the bureau (or division) of vocational and technical education of the State Department of Education. In Pennsylvania and Iowa it is operated by the Division of Guidance Services of the state education agency. In some states (e.g., Colorado, Indiana, New Hampshire, South Dakota, Tennessee) the vocational education agency contracts with the state university for the development and operation of the program, as was true in Kansas during the pilot phase. In Michigan and Missouri the project is under the auspices of a local school district on a contract from the state education agency.

Occupational Coverage

Because funding has been from vocational education appropriations, the kinds of occupations represented in VIEW decks are customarily those requiring less than a baccalaureate degree. (Technicians in the medical and engineering fields are usually included.) In response to demand, some states (Michigan, Pennsylvania, Tennessee) are now including occupations which require higher education. In the case of Tennessee, supplementary funding by the TVA has enabled them to extend coverage to professional and science occupations.

In general, the attempt is made to cover those occupations which are significant in the several labor market areas of the state, with additions made in response to expressions of interest by students and counselors. There is, therefore, a wide variance in the number of occupations covered by each state's VIEW deck, ranging from just over 200 to nearly 450 (e.g., Colorado-223; Louisiana-260; Kansas-350; Michigan-449; Oklahoma-216; Pennsylvania-260; South Dakota-416; Texas-326; Washington-425).

Informational Content

Typically, the microfiche for each occupation contains the following kinds of information:

Job description
Traits, aptitudes and physical abilities required
Education and training needed
Training courses available
Job locations and employment outlook
Opportunities for advancement
Salaries, hours, and benefits
Related occupations
Sources of additional information

Information on employment outlook and salaries is localized for each of the several economic regions of the state, frequently as defined by the state employment security agency.

In addition to the occupational deck, all states provide decks on training resources, which include information on occupational courses available at community colleges and area vocational-technical schools in the state, as well as on apprenticeship programs.

A national deck on 120 career opportunities in the armed services is available to each state from Indiana University, under a contract with the Department of Defense.

An effort has been made to write materials for the sixth to eighth grade reading level. Texas has produced a braille edition for the blind. Kansas and Pennsylvania (but surprisingly not Texas!) have Spanish language editions.

All states report that they update materials annually.

Sources of Data and Methods of Collection

Although there is a significant amount of sharing materials between states, and presumably standard reference works are utilized, each state VIEW project collects its own data and writes its own scripts. Pennsylvania has a staff of thirteen engaged in the preparation and implementation of the program. Michigan reports a permanent staff of four; Texas, three; Kansas, four. Several states report using high school students in interviewing and data gathering, and feel that such participation is a positive Career Education experience.

Perceptions of the quality of assistance by state employment security agencies are varied. In Texas, it is reported that while help was received from local Employment Service staff, state headquarters of that agency provides but small assistance. In Colorado it is alleged that there is little communication between the state Departments of Labor and Education, and it has been necessary to rely on area vocational school directors, for example, for information on emerging occupations.

A contrasting experience is that of Pennsylvania, where the employment security agency has cooperated extensively from the beginning of the program. In South Carolina, the VIEW program is officially a joint effort of the education and employment security agencies. Oklahoma, Tennessee and Kentucky depend upon the state Employment Security agency for localized data on employment outlook and salaries.

Administration

In several states (e.g., Michigan, Colorado, Pennsylvania) VIEW decks are provided without charge to all junior and senior high schools, area vocational schools, and community colleges. The only cost to the school is the microfiche reader ($100-200) or a reader-printer. The latter is considerably more expensive and consequently only a minority of schools possess one.

In states where the budget is more limited the program is on a cost-recovery basis, and charge is made for the VIEW deck (e.g., Texas, Tennessee, Florida), typically $55 to $65 per year.

Major attention is given to evaluation of the program and to in-service training of counselors and teachers. These subjects occupied a significant share of the agenda at the El Paso NCCIS meeting.

Annual evaluations consist of on-site observations and/or questionnaires to counselors and teachers, inquiring into how the materials are used and how their quality is regarded. In some states, occupational materials are reviewed by representatives of business and industry, or by an advisory committee. Informal feedback from users, including students, is encouraged, to obtain critiques of the usefulness of the VIEW deck.

In-service training of counselors, teachers, and other school personnel is regarded as vital to the success of the program, and the majority of the states represented at the meeting reported that they conducted such sessions. In most cases these are structured sessions held in various parts of the state throughout the year, from one hour to a full day in length. This training is supplemented by news letters issued at intervals during the year.

State representatives engaged in the VIEW program have established the National Consortium of Career Information Services for the purposes of communication, sharing, and assistance among the states. Objectives are further detailed in Article I of the by-laws.

Related Developments

VIEW was originally developed as an Occupational Information system for junior and senior high school students. With recent emphasis on the concept of Career Education, some states (e.g., Tennessee, Texas) are developing materials for use at earlier levels. Tennessee has produced four specific components, for K-3; 4-6; 7-9; 10-14. Texas has developed syllabi for levels K-3; 4-6; 7-8; 9-12.

VIEW, in its current form, does not contain its own system for access to occupational data, other than the OE fifteen-cluster occupational structure. To fill this gap, Iowa has integrated Oregon's CIS with the VIEW program, utilizing the former systems' QUEST together with needle-sort and computer-assisted options. The Appalachia Educational Laboratory has developed a "Career Decision-Making Program", based upon the worker trait groups of the D.O.T. Michigan is designing its own career exploration system to be used in conjunction with its VIEW deck.

Evaluation of VIEW System in California

In May of 1972 an evaluation of VIEW, as operated in California, was prepared by Tadlock Associates, Inc., of Los Altos, California, for the San Diego County Department of Education and the Vocational Education Section of the State Department of Education. The following is abstracted from the specific findings of the evaluation:

1. *The ten VIEW centers served 526 schools located in thirty-eight counties. Twenty-two percent of the schools were in urban centers,*

50 percent in suburbs, and 28 percent in rural areas. Eighty percent of the students in the schools served were in grades 9 through 12, representing more than half of all secondary school students in California in 1970-1971.

2. It is estimated that between 10 and 20 percent of the students enrolled in these schools actually used VIEW. The potential for use has not reached its peak with any school level - junior high through community college - and is untapped in adult education.

3. The funding structure (ROP support) appears to have created a competitive posture among the ten VIEW centers, because of the pressure to sell subscriptions for the VIEW decks they produce.

4. VIEW centers have been principally concerned with producing materials, with only minor emphasis on research, program development, or inservice training. There is a shortage of staff to meet these responsibilities adequately.

5. In the schools visited, 45 percent of the equipment consisted of readers of various brands, 31 percent were 3M Executive I reader-printers, and 24 percent were 3M 400's. In all schools which had the Executive I reader-printers, there were serious complaints about machine reliability.

6. In 55 percent of the schools visited, VIEW equipment was operable and readily accessible to students. In the remaining schools the equipment was not functioning properly or easily available.

7. Eighty percent of the educators surveyed stated that the VIEW centers were helpful; those who had experienced the greatest number of equipment failures were less satisfied.

8. Students surveyed indicated that they used VIEW more frequently than any other single source of Occupational Information. Students who used VIEW rated it highly; 85 percent said they liked it and would recommend it to a friend.

9. Despite some of the problems listed above, the evaluators concluded that no other career information system, whether computer-based, commercially prepared, in hard copy or microfilm form, does the job of providing up-to-date, localized, and easy-to-understand Occupational Information any better or as well as VIEW in California.

Summary

Attendance at the meeting of NCCIS in El Paso provided an excellent opportunity to obtain much information and many insights about the VIEW system in a very brief period of time. However, what one is exposed to in a meeting such as this are examples of the work being done, largely controlled by the agenda, the selection of individuals giving papers, and the composition of the conference participants. To obtain objective data, truly representative of the status of the program throughout the country, some survey research method (such as a questionnaire to each of the thirty-five states which have the VIEW system in some form) would be indicated.

With the above reservation in mind, there are several tentative conclusions worth reporting. First, and most obviously, the restriction in most states to occupations not requiring a baccalaureate degree, while permitting inclusion of some technician occupations in the medical and engineering fields, poses a serious question of relevancy to our concern for the higher-level occupations in science, mathematics, and technology.

Secondly, the lack of an access strategy as part of the system makes the VIEW program incomplete, at least theoretically, as a tool of Career Guidance. This is recognized by the practitioners, as evidenced by the efforts in Michigan, Iowa, and the A.E.L. to meet this need.

Third, the expressions of considerably less than unanimous happiness with cooperation and assistance from state employment security agencies were particularly disquieting. Where such help in the form of occupational and labor market information is not forthcoming, each VIEW project or local district must invest time and money in gathering its own localized data -- often from extremely limited samples because of staff limitations. Surely it is time to do something about this!

Finally, it needs to be said that, despite the questions raised above, VIEW is an important Occupational Information system that has earned widespread acceptance, and is in use in many school districts (though by no means all) of thirty-five states. In comparison with conventional printed materials, the microfilm technique has proved far more economical, more capable of organizing information for accessibility, and more attractive to users. It also offers a high degree of flexibility, being compatible with both manual and computer-assisted usage.

The preceding evaluation of VIEW by Tadlock Associates, Inc. emphasizes the problems connected with this delivery system, but also the advantages leading to its widespread use.

Man-Technology: Career Projects
2150 Shattuck Avenue, Suite 903
Berkeley, California 94704

Working Paper
NSF Grant No. EPP-74-20284
November 1975

SITE VISIT REPORT -- APPALACHIA EDUCATIONAL LABORATORY, CHARLESTON, WEST VIRGINIA

A. Nature of Project

David Winefordner, coordinator of AEL's Career Decision-Making program, and staff members Louise Lucas and Mary Antholz, were visited on July 17, 1975, to obtain an overview of their project. The Career Decision-Making Program has been developed by AEL, with funding from the National Institute of Education of HEW, as a Career Education package for use in secondary schools. It is based upon career development theory and consists of two major components:

(1) A set of fifteen Career Guidance units which provide core materials for lesson plans in career exploration and decision-making.

(2) A Career Information System which organizes Occupational Information, and access to such information, around the 114 worker trait groups arrangement of the Dictionary of Occupational Titles.

B. The Career Guidance Units

The fifteen units each contain a utilization guide, filmstrips and student materials on various aspects of career exploration and decision-making. The first four introduce basic exploration and decision-making skills. Units five through ten provide experience in exploring personal characteristics and in relating them to occupational fields through the worker traits groups arrangement of the D.O.T. Units eleven through thirteen examine the social, environmental, and economic influences on careers. The last two units provide practice in utilizing decision-making skills in developing career plans, including tentative occupational choices. Together, the units comprise course materials for a career program which can be used in a one semester course (preferably at the 10th grade level), or which can be infused into the regular curriculum.

Field testing of these units has been completed and it is anticipated that they will be available for purchase through a commercial publisher in 1976, with the cost estimated at $1200. Additional consumable materials will cost approximately $2 per student.

C. The Career Information System

This is a system for organizing, managing, and accessing occupational and career information products in terms of the 114 worker trait groups arrangement of the Dictionary of Occupational Titles. The package developed by AEL includes several basic guides and indexes, such as:

--A guide for filing occupational materials by worker traits.

--A guide for exploring careers through worker traits -- a revision of the 114 WTG descriptions in 8th grade vocabulary, in a format that can be used by students.

--Multi-occupational resources such as the Occupational Outlook Handbook, the Encyclopedia of Careers, and VIEW, indexed by worker trait groups.

--A key-sort index, consisting of a deck of 114 key-sort cards -- a manual system for accessing Occupational Information on a multi-variable worker trait basis.

This package has been field tested at 40 sites during the past year, and will be available through a commercial publisher in 1976. Estimated cost will be $500 to $600.

D. Conclusions

The AEL's Career Decision-Making Program is not a computer-assisted guidance system such as CVIS, VICS, ECES, or SIGI, although it is adaptable to computer application, for either batch processing or the interactive method. Nor is it an Occupation Information-generating system, such as VIEW. Nevertheless, it possesses some impressive features which merit attention. The guidance units have been thoroughly field tested and form a core of materials which can be flexibly used in a Career Education curriculum at the secondary level.

The Career Information System is unique in the way it utilizes the worker trait grouping of the D.O.T. as the means of organizing and accessing occupational information. It provides a method whereby an individual can explore occupations by relating personal characteristics to the abilities, interests, temperaments, physical requirements, working conditions, and worker functions which have been found to be associated with occupational performance through many years of occupational research by the U.S. Department of Labor. This system may therefore be more empirically sound and possess greater occupational validity than some of the more theoretical "interests" and "values" constructs used in other approaches.

Mr. Winefordner made one suggestion which NSF may wish to pursue. This relates to the need for guidelines which school districts could use in developing community resources in the science occupations including guest speakers, job site field visits and work experience opportunities.

APPENDIX - CHAPTER VI

Man-Technology: Career Projects
2150 Shattuck Avenue, Suite 903
Berkeley, California 94704

Working Paper
NSF Grant No. EPP-74-20284
November 1975

RETURNS FROM STATE CAREER EDUCATION DIRECTORS' QUESTIONNAIRE

As we continued with our reading and interviewing, certain questions increasingly came to the fore. What is the relationship between Career Guidance and Career Education as perceived by administrators and by the practitioners in the schools? Whose responsibility is it to implement "Career Education concepts" so many of which seem indistinguishable from the principles of developmental theory? Where does the counselor fit in? What is (or could be) the impact of Career Education on the gifted student and more particularly on the science major?

We discussed these questions with Dr. David Jesser, Director of Career Education for the Council of Chief State School Officers, remarking that we found the Career Education people we had met on our site visits far more alive to our concerns than, as a rule, the counselors. Also, the systems developers seemed particularly interested in applications of their work to Career Education, indicating that is "where the action is."

Dr. Jesser suggested that we direct a series of questions to a selected group of State Chiefs of Career Education. He identified six whom he believed it would be especially productive to contact because of the nature of the Career Education effort in their states, and all six responded.

One of our objectives in contacting these officials was to locate, if possible, any ongoing programs that might have been designed with the needs of science students in mind. However, we broadened our general approach so as to focus, first, on the gifted student and only then on the student with strong capabilities for entering careers in science, mathematics and technology. We adopted this approach because there was good reason to believe that Career Education projects directed even to gifted and talented students (a group to which at least some attention has been given by Career Education people) would be hard to find, let alone projects for the student specifically oriented to science. Dr. Kenneth B. Hoyt who heads the national Career Education effort has spoken to this point as follows:

> *"Efforts to locate Career Education programs for the gifted and talented have for the most part been unrewarding. . . . Evidently very little has actually been accomplished which could be described as a permeating career education focus for the gifted and talented, which would accompany general education from kindergarten through the twelfth grade."*
>
> (Hoyt, K.B., and Hebeler, J.R., Career Education for Gifted and Talented Students (Olympus Publishing Company, Salt Lake City, Utah, 1974, pp. 209-210).)

Below are the questions asked of the six selected Career Education officials together with their answers.

Q.1.

Some of our respondents have viewed Career Education as essentially a part of Career Guidance, i.e., various Career Education components (structured work experience, observing jobs, infusion within the curriculum of work skills and job information) may be considered media for delivering career information. In other words, the best Career Guidance a student can receive is by means of a strong Career Education program.

Others see Career Guidance as a part of Career Education. These individuals consider the counselor as primarily a member of the Career Education team, helping to maintain liaison with the community, assisting teachers to incorporate Career Education modules in the curriculum and, in general, serving in the front line to advance the concepts and practices of Career Education.

How would you characterize the proper relationship between the two -- both at the level of theory and in terms of administrative organization?

State 1

"In _____ we see Career Guidance as a part of Career Education. We believe all educators must be involved with implementing Career Ed. concepts - and that ownership does not belong to a specific group or title."

State 2

"Career education is a concept - not a program. Many programs within all education disciplines are an integral part of the concept. Guidance, particularly career development guidance, permeates the total concept as a supportive service.

"Because many of the goals of guidance programs are an integral part of Career Ed., guidance professionals assume some leadership responsibility for career ed. In this leadership role they act as catalysts, resource and liaison persons.

"Administratively, they work with the Career Education Coordinator or (if no such position) with teaching or supervisory personnel responsible for development of Career Ed."

State 3

"Career Education is the system which delivers the skills and knowledge people need to explore, understand, and perform their various life roles -- as student, worker, family member and citizen." This knowledge consists of:

Career Development	and	Career Preparation

"These, in turn, involve:

-Self awareness & assessment	-Academic education
-Career awareness & exploration	-Vocational education
-Career planning & placement	-Technical education

"The delivery system for this body of knowledge is the teacher and the counselor."

State 4

"Career Guidance is a part of Career Education -- the counselor is primarily a member of the Career Education team."

State 5

"In _____, Career Education is intended to be an integral part of the total educational program, and embraces the concept that each individual must learn to function effectively in six life roles: learner, individual, producer, citizen, consumer, and family member. Using the producer role as a major focal point, Career Education provides, within the curriculum, learning experiences to develop the attitudes, knowledge and skills that enable persons to perform successfully in an occupational role and assist them in related life roles. These learning experiences center around four major objectives: (1) to enhance learning about oneself as a basis for future career decisions; (2) to provide awareness and exploration of potential occupational fields; (3) to provide career exploration in occupational clusters, leading to competencies for employment or further education; (4) to develop advanced competencies needed for effective performance in a specific occupational area.

"The total curriculum must provide opportunities for developing insights into exploring and preparing for the life roles continuously, and at the appropriate interest and comprehension level for each learner.

"Career Education in _____ begins with the student's earliest schooling experiences and extends through their adult life. It encompasses:

a. Career awareness
b. Career exploration
c. Occupational preparation
d. Occupational specialization
e. Career guidance."

State 6

"We adhere closely to USOE's definition of Career Education and component parts identified by the U.S. Office. Therefore, I feel that Career Guidance and Career Development are part of the overall Career Education effort."

The consensus, unmistakably, appears to be that Guidance is a part of or supportive to Career Education. The counselor's role is to assume some leadership responsibility, to be a "catalyst, resource and liaison person." He is regarded as a "member of the Career Education team" and, along with the teacher, a part of the "delivery system" for the body of knowledge that comprises Career Education.

* * * * * * * * * *

Q.2.

Despite the often-heard charge that the gifted (or, at least, the college-going student) receives the lion's share of counseling, we have often been told that this type of student receives the least amount of help in career decision-making and the least career information upon the assumption that both will be forthcoming in college. Whatever the merits of these two positions:

a. Do you believe that the gifted student, particularly the student with strong capabilities for pursuing a career in science, mathematics or technology needs special career attention while in high school?

State 1

"Yes -- special in that it must meet the student's needs. I assume the 'gifted' student has different needs than the 'average' student or 'handicapped' student."

State 2

"All students need learning experiences that will assist them in a realistic self appraisal of their aptitudes, interests and values, as well as realistic information about the world of work."

State 3

"Yes, relating to their unique capabilities. Similarly, the child gifted in non-cognitive areas should have special career attention."

State 4

"Yes, if they are to be knowledgeable about what they are planning for."

State 5

"Yes. As much as other exceptional students."

State 6

"Yes."

The consensus -- "Yes," of a sort tailored to the specific needs of that particular student as guidance should be devised to fit the unique needs of all students.

* * * * * * * * * *

Q.2. b. In your opinion, what type of career attention is such a student likely to receive in the public secondary schools of your state?

State 1

"1. Special work experience programs
2. More challenging assignments
3. Have funded several 'projects' that have goals that will impact on the gifted student."

State 2

"Attention, if any, is concentrated upon college programming -- loosely related to a tentative career goal."

State 3

"Advanced placement at university, leaving any initial career direction until that time."

State 4

"Motivation, Orientation and Exploration."

State 5

"Career attention generally will be focused upon their academic/college career."

State 6

"Very little."

Attention is apparently focussed upon these students' obtaining the necessary skills for further education rather than immediately saleable skills as they are not likely to be terminal students at the high school level. However, State No. 1 is embarking upon projects to apply various Career Education concepts directly to these students.

* * * * * * * * * *

Q.2. c. In what ways do you think a vigorous Career Education program (or the services offered by Career Education) can particularly benefit the above type of student?

State 1

"The student should benefit by (1) learning how talents can be utilized; (2) being aware of a larger variety of career opportunities."

State 2

"As for all students -- self appraisal and realistic information re world of work. In addition, skill in decision-making is an integral part of career education concept that should benefit these as all students."

State 3

"They will be exposed to numerous careers which broaden their options, plus learning decision-making and career planning skills."

State 4

"Exploration and orientation to roles in field of interest."

State 5

"A vigorous career education program with a strong career guidance component will benefit the gifted by paying a lot of attention to their inter-personal development and it will also provide an environment for them to gain a wider view of job opportunities."

State 6

"I believe that team effort by the guidance counselor and classroom teacher would be extremely beneficial to the gifted and talented student in the classroom. It is my opinion that all students, no matter what their capabilities are, benefit from a career education effort."

The gist of these comments appears to be that these superior students, like all others, can benefit while in high school from acquiring greater self awareness, a wider knowledge of the work world and more facility in decision-making skills than is gained without Career Education applications.

* * * * * * * * * *

Q.2. d. Please describe, if there are evidences that such a program is benefitting this type of student in your state:

State 1

"We have evidence that the student is benefiting from career education -- but have not broken out information on 'gifted' students."

State 2

"Too recent to provide such evidence."

State 3

"Operation Guidance Field Test in four _____ districts."

State 4

"Grades 7-8 -- Orientation to wide variety of jobs available
9-10 -- Exploration in areas of individual interest
11-12 -- Pre-professional courses and exploration in preparation for further study."

State 5

"Several schools in the state are trying to meet this need. Among them are:

1. __________
2. __________
3. __________
4. __________
5. __________."

State 6

"We have no empirical evidence at the present time in this state; however, we have strong belief that career education is beneficial to students."

The prognosis is optimistic but the evidence is not in as yet.

* * * * * * * * * *

Q.3.

What specific aspects of Career Education might particularly benefit the student considering a career in science, mathematics or technology (e.g., introduction of career education modules into the curriculum, observation of workers on the job, localized Occupational and Educational Information about jobs in science, etc.):

State 1

Enclosed brochure to answer this "very important question".

State 2

"Carefully structured learning experiences that provide:

1. Specific orientation to the science, mathematics and technological occupations within each of the career clusters
2. Comparable learning experiences that provide exploratory opportunities within the clusters."

State 3

"The in-depth occupational analysis (intern, simulation, etc.) will interject the physio-motor, affective domain into the student's frame of reference."

State 4

"Observation; relationship of the theory to the practical mode at the secondary level in basis courses."

State 5

"_____'s minimum graduation standards require one unit of career education and therefore, school districts are meeting this need in a variety of ways including all of those examples you cited. In addition: workers come to the schools, and we

> have various tools relating basic educational skills to their specific curriculum. Career guidance, a cluster approach, to name a few, all benefit the student interested in a science career."

The consensus -- the basic tools of Career Education would be as applicable to and are needed as much by science majors as by other students.

* * * * * * * * * *

Q.4.

If you know of any applications of Career Education concepts and practices in your state or elsewhere that are specifically directed to gifted students, including the above type of student, or that involve the assistance of employers who hire significant numbers of workers in science and science-related occupations, please describe:

Four of the respondents furnished names and addresses of projects. We have contacted the directors. All projects are as yet in a developmental phase and can not furnish evaluative data.

* * * * * * * * * *

Q.5.

What, in your opinion should be done that is feasible and cost-effective in order to improve the Career Guidance provided to students with strong capabilities in science, mathematics and technology? (If your answer is to improve the Career Guidance given to all students, we hope you will tell us what you think is needed to achieve this laudable objective.)

State 1

"1. Incorporate career awareness into science-math courses
 2. Include the industrial community in the classroom
 3. Relate science-math concepts to applications in the world of work
 4. Expose teachers & counselors to scientific occupations."

State 2

"Identify kinds of learning experiences that provide an adequate 'sample' of aptitudes and interests relevant for science careers. Should be learning experiences started in early childhood and sequentially developed until the decision-making points. Only with these experiences can a student arrive at a self-appraisal of his or her interests, aptitudes, and values.

"Need reinforcing, exploratory, learning experiences that provide the sight, sound, taste, smell and feel of science-based careers."

State 3

"Insist that all students must proceed through a career exploration model which includes self-awareness, career awareness, decision-making and planning. This program should be jointly organized by counselors and teachers."

State 4

State 5

"1. Train all staff in all schools in the career guidance skills needed

2. Upgrade the knowledge of guidance counselors in occupational information
    (a) Where to get it
    (b) How to disseminate it
    (c) What is needed

3. Train/retrain counselors to be able to make input to the curriculum

4. Train those who have primary responsibility for career guidance to inservice all others

5. Upgrade higher education to preservice all potential teachers/counselors/administrators in career guidance skills

6. Clearly define roles and responsibilities in schools so that a cost effective articulated K-12 guidance system will exist within districts."

State 6

"In my opinion the role of the counselor in public schools is not specifically defined. The role, at present, is very diverse, depending on the school district. It is my opinion that the number one priority is to identify the role of the guidance counselor in the school setting and that part of the role should not duplicate the school psychologist or sociologist. It is my opinion that the counselor can best serve students by working in a team teaching situation in the classroom and in group counseling activities. I sincerely believe that any counseling effort would be much better if the role were specific and if much group work were done."

Opinions range from the quite general to very specific prescriptions for the application of Career Education concepts to science education. The reply of State No. 2 raises an important question inasmuch as there are many schools where science is not taught in the early grades.

* * * * * * * * * *

Q.6.

Any other opinions you wish to express or suggestions you may have?

State 1

"Like to be kept informed of progress on report."

State 2

". . . in our technological society there is a serious need to help literally millions of students who, although they may not be classified as the 'gifted', will find their self-fulfillment and make a contribution to our society by a life's work in the world of science, mathematics and technology."

State 3

- - - - - -

State 4

- - - - - -

State 5

- - - - - -

State 6

". . . it is the feeling in our state that since the U.S. Office of Education has come out with a definite position on career education, that we should adhere to that position as closely as possible."

APPENDIX -- CHAPTER VII

(NOTE: The following charts are reproduced from Application of Information Systems to Career and Job Choice -- a paper presented to the Conference on "Improving Labor Market Information for Youths" at Temple University, Philadelphia, PA by Dr. Barry E. Stern on October 22, 1974.

In describing the Department of Labor's National Occupational Information System Grants Program, he used these matrices to provide a normative typology of information development attributes and of other system characteristics by which the leading Career Guidance and information systems can be compared. He points out that the quality and amounts of Occupational Information delivered is not central to the purposes of a number of systems but that a normative typology is nonetheless useful for those wishing to know that the different systems do and do not do in terms of providing useful career information to students.

The selection of systems presented in these charts is the same as that described in Chapter VII except for DISCOVER which was not operational at the time of Dr. Stern's study or when its development site was visited in connection with this project.)

Chart 2. Career Guidance and Information Systems by Information Development Attributes

System	Information Topics and Coverage of Occupations	Localized and State as well as National Occupational Information	Accuracy and Currency	Brief Overview of Occupation Provided	Referral to Other Sources of Information	Job Search Information Available
OIAS	* Most occupational information topics covered for most occupations in Oregon and other significant occupations outside State when data available. * Coverage of postsecondary institutions limited to Oregon.	* Both state and local information about occupations and education/training. * 5-person research staff compiles information for all major labor market areas in Oregon.	* Continual review and yearly update of occupational and education-training information when new data available. * Occupational review panels to validate information.	* Has 300 word occupational brief for each occupation in file.	* Bibliography of reference materials about occupations. * Taped interviews with workers. * Names of local people who can discuss occupations.	* No
CVIS	* Most information topics covered for wide spectrum of occupations. * Has military information and national file of 1,510 4-year colleges.	* No local or state Occupational Information. * National information purchased from Ferguson and Company. * Has local education, training, and apprenticeship information for Villa Park, Illinois, and other CVIS sites encouraged to obtain similar local information.	* Ferguson & Co. updates every 2 years the national Occupational Information it provides. * College data file updated yearly by direct mailing to admission offices.	* Provides overview.	* None	* List of employers in DePage County, IL, who offer entry opportunities in particular occupational category.
SIGI	* Most information topics covered for wide spectrum of occupations. * Detailed education/training information for community college using system. * 4-year colleges described within 300 mile radius of user community college.	* No local or state Occupational Information but attempt to develop regional information.	* General occupation descriptions updated yearly. * Change-sensitive topics like wages and outlook updated semi-annually. * Information review and update performed by an Occupational Information specialist and 2 ETS Research Assistants.	* Provides brief description of job duties and tasks. * User can compare three occupations on a single topic (e.g., wages, outlook, etc.).	* Referral to trade and professional associations.	* No

(Continued)

Chart 2. (Continued)

System	Information Topics and Coverage of Occupations	Localized and State as well as National Occupational Information	Accuracy and Currency	Brief Overview of Occupation Provided	Referral to Other Sources of Information	Job Search Information Available
GIS	* National college data base is comprehensive; includes 2-year and 4-year colleges. * Most occupational topics covered for wide spectrum of occupations. * Data bases uneven in their comprehensiveness and quality.	* No local or state Occupational Information. * National information leased on annual basis from Houghton-Mifflin in cooperation with Time Share Corp.	* College data base updated yearly. * Occupational file updated as frequently as major sources of national information.	* Provides overview.	* Referral to trade and professional associations.	* No
ECES III	* Most information topics covered for wide spectrum of occupations. * Has national file of 2-year and 4-year colleges and 1-year technical schools.	* National information culled from Occupational Outlook Handbook and from OTIS information purchased from Oklahoma. * VIEW system in Michigan will provide some state and local information.	* No verification procedures, i.e., no reconciliation of information from different sources.	* No, student must read a considerable amount of material to cover information topics for each occupation.	* One-day work internship available to student who has made tentative career choice after interacting with system.	* No
VICS	* Most information topics covered for wide spectrum of occupations.	* Both occupational & education/training information geared to Philadelphia labor market. * Two and a half FTE counselors from school system collect, appraise, and write-up information.	* Yearly review and update of all information. * Produce much of own information through mail-outs, phone calls, and personal visits. * Weak verification procedures.	* Provides overview. * User can access information topics singly or collectively.	* Where in Philadelphia one can be employed in occupation. * Names of people in schools outside Philadelphia to obtain information.	* 4,000 local employers with addresses listed, each with employment skills and educational requirements necessary for entry level positions.

(Continued)

Chart 2. (Continued)

System	Information Topics and Coverage of Occupations	Localized and State as well as National Occupational Information	Accuracy and Currency	Brief Overview of Occupation Provided	Referral to Other Sources of Information	Job Search Information Available
VIEW	* Most Occupational Information topics covered for occupations with significant amount of employment in local area. * Has preparation requirements, but no education program characteristics. * Descriptions of 2-year and 4-year colleges in California.	* Local and occasionally state information provided, depending on VIEW site.	* Most VIEW projects have yearly review and update of information. * Produce much of own information through mail-outs, phone calls, and visits. * Some VIEW systems have better verification procedures than others.	* Provides overview.	* Depends on which VIEW site. Generally provides referral to professional and trade associations.	* No
AEL	* Most occupational information topics provided for wide spectrum of occupations. * No education/training information, except for general preparation requirements.	* National information is culled from Occupational Outlook Handbook, Dictionary of Occupational Titles, and Encyclopedia of Careers. * No systematic development of local/state information. Occasional acquisition of locally relevant occupational materials.	* Same updating problems as national sources mentioned. * No systematic verification and update of locally relevant occupational materials.	* Provides overview.	* Referral to 15 Career Guidance units, but limited in information content.	* No

Chart 3. Career Guidance and Information Systems by Information Delivery Characteristics

	Dissemination Media	Accessing Strategy to Obtain Occupational Information				Immediacy of Retrieval	Copy of Information To User	Compatibility of Different Information Sources
			Structured Access					
		Direct Access	Available	Basis of Matching Personal and Job Chacteristics	Use of Student Records to Predict Success in Training for Occupation			
OIAS	* Computer teletypewriter terminal. * Needle-Sort cards with computer dumps bound in book form.	Yes	Yes	Worker Traits	None	Obtains information before leaving system.	Printout belongs to user.	Computer dumps collated and bound in book form every three months. Must return old dump in order to get new one.
CVIS	* Computer cathode ray tube, sometimes with printer, or teletype terminal.	No	Yes	Roe's classification system which relates preference within eight Interest Areas to amount of post-secondary training desired.	* Class Rank * Achievement Test Scores * Kuder Interest Inventory	Obtains information before leaving system.	Printout, if available, belongs to user.	Only one source in system.
SIGI	* Computer cathode ray tube with printer.	No, but after first use of system a type of direct access is provided.	Yes	Values, as clarified by playing values game which presents series of dilemmas	* High School Class Rank * Selected Achievement Test Scores * Selected Marks * Biographical and other data (e.g., self-estimates on factors for success identified by instructor)	Obtains information before leaving system.	User can select certain portions of interaction with computer to be printed.	Only one source in system.
GIS	Computer teletypewriter terminal.	Yes	Yes	Worker Traits + Office of Education's fifteen Occupational Clusters. + Desired amounts & kinds of post-secondary education.	None	Obtains information before leaving system.	Printout belongs to user.	Only one source in system.

(Continued)

Chart 3. (Continued)

	Dissemination Media	Accessing Strategy to Obtain Occupational Information				Immediacy of Retrieval	Copy of Information To User	Compatibility of Different Information Sources
		Direct Access	Structured Access					
			Avail-able	Basis of Matching Personal and Job Chacteristics	Use of Student Records to Predict Success in Training for Occupation			
ECES III	* Computer cathode ray tube with (color) microfiche reader.	No	Yes	* Interests as measured by Ohio Vocational Interest Survey, as well as self-estimates. * Values (self-estimates).	* Self-estimates of aptitudes and abilities. * Grade point average.	Must use system for several hours before obtaining information.	Not available.	Only one source in system.
VICS	Computer teletypewriter terminal.	Yes	Yes	Roe's classification system which relates preference within eight Interest Areas to amount of post-secondary training desired.	None	Obtains information before leaving system.	Printout belongs to user.	Only one source in system.
VIEW	Various micro-forms, including: - microfiche - aperature cards - cassettes with reader or reader-printer	Yes	No	(not applicable)	(not applicable)	Obtains information before leaving system.	If reader-printer available, user can get printout.	Often located in career resource centers with printed materials which are not compatible with microfilm information.
AEL	* Various printed materials which are cross-indexed with one another. * Needle-Sort cards which refer to other printed sources.	Yes	Yes	Worker Traits	None	Obtains information before leaving system.	Must Xerox pages from printed materials if copy desired. If VIEW used, microfilm reader-printer provides copy.	No attempt made to make locally relevant printed or microfilmed materials (VIEW) compatible with one another.

APPENDIX - CHAPTER VIII

Man-Technology: Career Projects
2150 Shattuck Avenue, Suite 903
Berkeley, California 94704

Working Paper
NSF Grant No. EPP-74-20284
May 1975

RETURNS FROM PROFESSIONAL SOCIETIES' QUESTIONNAIRE

On March 21, 1975, questionnaire schedules were sent to fifty-five professional societies listed in bibliographies of the Scientific Manpower Commission and the National Vocational Guidance Association as publishers of Occupational Information in science, mathematics and technology. Forty-five or eighty-three percent were returned by May 15.

Sixty percent of the responding societies described their publications as occupational descriptions, with the majority covering a single profession. Hardly any covered more than two or three occupations, with the single exception of the American Medical Association, which accounted for thirty-nine occupations in the materials published by its divisions of health manpower and allied medical services.

Twenty-five percent of the respondents characterized their publications as more general in nature, covering a "career field".

These societies can be considered major publishers of Occupational Information. Two-thirds of them reported a distribution of from 20,000 to 100,000 copies per year of their releases. All provide copies on request, although many charge for multiple or volume orders. However, most maintain that they have no way of knowing the number of schools that receive copies.

This fact, coupled with the small mention by school officials in our questionnaire addressed to them concerning the guidance materials published by professional societies, raises the possibility that a serious deficiency may exist in the distribution of these occupational materials.

Half of the respondents had not issued new publications in the past year, but more than seventy-five percent had completed revisions of some of their earlier materials. Sixty percent state that they update their publications at least every three years -- a far better record for currency of information than can be claimed by the state employment security agencies that produce Occupational Guides.

All of the societies considered high school students as one of the primary groups to which their publications were directed. Slightly more than half reported that they were not orienting their publications, either in whole or in part, to such special groups as women and ethnic monorities. However sixty percent recognized a need for such orientation; lack of funds was the obstacle to publishing such materials that was most frequently mentioned.

In describing the major sources of information for preparing their occupational materials, our respondents reported their heaviest reliance to be upon membership records, surveys of employers, and other research conducted by the society. Only in the areas of wages and hours, employment data, and occupational outlook was reference made to information obtained from BLS and other federal agencies -- at about the same frequency of mention as for the Engineering Manpower Commission and the Scientific Manpower Commission.

As to the background of the staff members engaged in the production of occupational materials, these societies overwhelmingly depended upon people in the profession served by the organization. Eighty-three percent of the respondents reported utilizing members of the subject profession. Fifty-six percent also reported the use of professional writers. Research assistants and educators were mentioned by twenty percent.

Significantly, almost half of the societies reported that they are now producing audio-visual materials (either films or slide-tape presentations) as well as written materials.

In reporting on the methodology of preparing occupational materials, ninety percent described the process as the responsibility of a committee of the society, coordinating input from several sources. Half (22) cited sending questionnaires to society members or industry members; seventeen reported utilizing information published elsewhere. Only six of the forty-five respondents mentioned on-site investigations. As to evaluation of their products, twelve stated that no formal evaluation was conducted. Thirty referred to internal reviews, usually by a committee, but sometimes by way of feedback from members.

In addition to the above queries about their own materials and methodology we also invited comments about occupational publications in general -- percaptions of deficiencies in guidance materials and suggestions for facilitating production, improving content, and improving delivery. Only twenty of the forty-five responded to this group of questions. The most frequently mentioned deficiency (11) was that the content is often too general, inaccurate, and lacking in adequate information about employment opportunities and outlook. Eight mentioned lack of funds as a problem.

The most significant recommendations were those relating to the delivery of information; six suggested some form of clearing house or centralized communication system which would inform students about available occupational materials. Six referred to the need for improving the professional competence of counselors in the use of guidance materials.

RETURNS FROM COMMERCIAL PUBLISHERS' QUESTIONNAIRE

On March 26, 1975, questionnaire schedules were sent to twelve commercial publishers of Career Guidance materials. These were selected as being the most frequently mentioned as publishers of occupational materials in science, mathematics and technology in bibliographies of the National Vocational Guidance Association and the Scientific Manpower Commission. Ten of these organizations returned the schedules by the end of May.

Seventy percent of the respondents classified their products as occupational descriptions or as combinations of occupational and training information. The remainder described their output as more general "world of work" and "career exploration" materials. In attempting to identify the number of occupations covered, a clear dichotomy appeared. Half of the responding firms publish materials for several hundred occupations, with those in science ranging from seventy-five to one hundred-fifty. The other five organizations are smaller in size, and the occupations in science, mathematics and technology covered in their products range from eight to twenty-eight. Six of the ten respondents estimated the number of schools receiving their publications, and gave figures ranging from 3,000 to 10,000.

Eight of the ten respondents had each issued several new publications on science occupations in the past year, as well as a larger number of revised editions of previous publications. The scheduled frequency of revision, however, did not appear as good as that reported for the professional societies. Two stated that revisions were made "every year or two", and one reported a three-year revision schedule. The majority revise their publications about every five years.

All of these organizations regard high school students as the primary target of their publications, and most consider their products suitable for college students as well.

Five of the respondents orient their publications, in whole or in part, to special groups (women, ethnic minorities, handicapped); two others believe that there is a need for publications directed to special groups, but regard such efforts as unprofitable for a commercial firm, or the proper responsibility of special interest groups. Thus, seventy percent of the respondents acknowledge the existence of a need for approaches oriented to special groups in guidance materials. There was some expression of concern, however, that separate publications for special groups might be counter-productive, either arousing resentment of ethnic or women's activist organizations over "segregated" treatment, or seeming to limit opportunities to those covered by special publications, rather than enlarging opportunities. This viewpoint was also expressed by some of the professional societies previously surveyed. It is probable that the best method would be to include information of particular interest to such groups in general releases, rather than in separate publications.

In responding to questions concerning sources of information utilized in preparing occupational materials, four of the organizations were unable to provide specific data because it is their practice to contract with free-lance writers or consultants for the preparation of their publications. In general, they report that these writers have specialized knowledge of the career field and are responsible for their own research. The six firms which prepare their publications in-house unanimously report extensive reliance on the Occupational Outlook Handbook and other Department of Labor publications for all subject matter areas. This is in marked contrast to the returns from the professional societies questionnaire. Prominent mention was also given to professional societies and their publications, as well as to employers, as sources of information.

The numbers of staff engaged in the preparation of occupational publications varied from three to ten. Size depends both on the volume of the firm's production and whether publications are prepared in-house or are contracted out to consultants or free-lance writers. In terms of background of staff, most mentioned professional writers and editors. Four mentioned guidance counselors; three, educators; and two, research analysts. One organization reported the M.A. degree as a minimum requirement.

In reporting on the methods used in gathering information for their materials, practically all relied upon questionnaires, interviews, and reference to other publications. Four of the firms also utilized on-site investigations. All of the respondents stated that they subjected their materials to review by experts in the occupational field prior to publication. A majority also reported that they relied upon review by the NVGA, as well as feedback from users as additional evaluation measures.

Half of the respondents stated that they are also engaged in the production of audio-visual materials, such as films, film strips, or microfiche.

Only two of the respondents mentioned deficiencies in Career Guidance materials in general. One referred to the need for more up-to-date information about occupational changes; another criticized the tendency of some publishers to over-glamorize occupations.

APPENDIX - CHAPTER IX

(NOTE: In correspondence with the sponsoring agency, we were asked to summarize "What others are doing" as part of this study. Hence, in this Appendix section will be found "what others are doing" in the National Occupational Information Service of the Department of Labor and in the Office of Education and the National Institute of Education of the Department of Health, Education and Welfare. The inclusion of only these three prime movers in the fields of Career Information and Career Guidance is not meant to infer the absence of much valuable work oriented towards improving Career Guidance in many other agencies and institutions both public and private.)

"WHAT OTHERS ARE DOING"

1. U.S. Department of Labor

Programs and services affecting directly and indirectly the stock of Occupational Information available for Career Guidance and the delivery of this information are to be found throughout the bureaus, offices, and divisions of the Department of Labor. Many of these programs and services are under continuing scrutiny and revision so that their products and spin-offs may have greater utility for Career Guidance. Some are now being reviewed and new programs may be initiated in line with an emerging emphasis on facilitating the transition of youth from school to work.

The fact that this section of the Appendix is limited to the description of a single Department of Labor program in no way is meant to minimize what is being accomplished for Career Guidance by DOL personnel in many quarters of the Agency. To cite but a few examples, there are those who are working on the Occupational Outlook Handbook, the forthcoming revision of the Dictionary of Occupational Titles, adaptations of Job Bank data to counseling needs and those who recently, along with Office of Education officials, worked out an interagency agreement for the "development of occupational manpower information" which constitutes a real breakthrough in establishing a coordinated national leadership in this field. One newly launched program, however, is so directly in point with the concerns of this study, and has so large a potential for the future of Career Guidance, that we shall concentrate exclusively upon this activity to illustrate "what others are doing" in the Department of Labor.

In August 1974, the Secretary of Labor by means of a letter to the State Governors and to the heads of United States offshore jurisdictions announced a grants program to encourage the development of Occupational Information systems in states and local areas. This announcement implemented a statement by the President of the United States made shortly before in a speech to Ohio State University graduates promising a national pilot program to improve the quality of career information.

At the same time, the National Occupational Information Service (NOIS) was established within the Office of the Assistant Secretary for Manpower. This service was to oversee the two-stage grant application procedure used. First, it reviewed the preliminary applications sent in by interested states, awarding small planning grants to the most promising candidates. Then the final detailed proposals from this group of states were reviewed and those were selected to receive grants which most nearly met the program objectives, standards and guidelines regarding information development, information delivery and organizational structure prescribed in the original announcement.

On June 4, 1975, the Secretary of Labor announced that eight states had been selected by the Department to develop Occupational Information systems designed to help students make career choices. Grants, averaging $300,000 each were awarded to Alabama, Colorado, Massachusetts, Michigan, Minnesota, Ohio, Washington and Wisconsin to support state efforts to compile, analyze, and disseminate current Occupational Information. It was stated that

> *"a key objective of the program is to develop active policy making boards which will integrate and strengthen the relationships of various groups involved in producing and utilizing educational, occupational and labor market information."*

The Secretary also stated that prime sponsors under the Comprehensive Employment and Training Act (CETA), business, and labor organizations would be included on the boards governing these systems as well as state employment security and vocational and other education agencies. The Occupational Information systems would have a central staff of experts to develop information and provide technical assistance for users. Further, an important parallel function of the system would be to provide training for user agency staffs including counselors and teachers so that they might be better able to use the Occupational Information system in counseling and instructional processes.

It was also announced that occupations reflecting state and local labor markets would be covered by the Occupational Information systems with the information provided through these systems to include topics such as job duties; legal, educational, and training requirements for entry; current employment; job outlook; and earnings and fringe benefits. Provision would also be made to relate personal interests, aptitudes, and abilities to occupations.

Included among the program's objectives were the following:

- -- To help persons learn about and understand career options.
- -- To help labor force entrants become aware of occupations which are acceptable and personally satisfying.
- -- To encourage persons in the process of making decisions on careers to explore vocational possibilities on their own.
- -- To increase awareness of major sources of Occupational Information.
- -- To provide support for related programs including Career Education, career and employment counseling, and manpower and educational planning.

Finally, the Secretary stated that it was an intent of the program that

> *the Occupational Information systems which were developed would be evaluated and the results of their operations used to form a technical assistance base for other states and large localities interested in developing similar systems.*

The "guidelines" of the program that served as criteria for the grantee states provide indicators as to the shape that these systems will assume.

As examples, the grantees have been charged with covering a wide range of information topics for each occupation included in their systems, and the accuracy, currency and localization of the data supporting these topics are stressed. Systems developers must make maximal use of existing information and information sources and arrange for feedback from users of the information their systems provide. Delivery systems should be demonstrably effective for persons of varying ability and experience and stimulate further occupational exploration. System components should be user-operable; the hardware required should be standard equipment and the delivery medium must have the capability of providing the user, for his future reference, a copy of the basic Occupational Information given him by the system.

It was also prescribed in the guidelines that the accessing strategies or approaches used to obtain information should be available both on a "direct access" and a "structured search" basis depending on the preference of the user. Injunctions appear in the Guidelines as to guarantees of the confidentiality of personal data. It is of the essence of this program that costs for the delivery system must be kept at a level per user which will make it feasible for user agencies or local or state governments to support them financially, for the grantee states must assume that their systems will need to be fully self-supporting within a very few years.

With the grantee states selected and the directors of the eight systems appointed, and with preliminary work on data-development and "marketing" plans under way, a NOIS sponsored conference was called together in Washington, D.C. during the week of November 10-14, 1975.

This meeting, attended by the writer, was scheduled primarily to assemble the grantee project developers and key staff; officials of related programs in the Manpower Administration, Bureau of Labor Statistics, and State Employment Security agencies; and others involved in the development of Occupational Information and dissemination systems. The conference agenda included sessions on techniques for Occupational Information development; an examination of national, state, and local data sources; program evaluation objectives and methods; and a description of NOIS technical assistance, training, research and monitoring functions.

The emergence of an informal consensus among those attending and those managing the conference became readily apparent before its final session. There appeared to be general agreement that the NOIS program with its enormous potential for improving the development and dissemination of career information will require much coordinated effort among government and other agencies and much assistance from those who are called upon to give it, and able to provide it, if this program is to live up to its promise.

2. U.S. Office of Education

The United States Department of Health, Education and Welfare, through the recently created Office of Career Education in the Office of Education, is currently funding eighty research projects which were selected from among 800 submitted proposals. This is in direct response to Section 406 of P.L. 93-380 -- The Education Amendments of 1974. In the words of Congress the purpose of the program is to "support projects to demonstrate the most effective methods and techniques in Career Education and to develop exemplary Career Education models".

The $10,000,000 for funding these eighty projects is the first money Congress has appropriated specifically for Career Education according to Kenneth Hoyt, Associate Commissioner of Career Education. In a July 4, 1975 memorandum to: State Coordinators of Career Education and 1974 "Mini-Conference" Participants, Kenneth Hoyt quotes CFDA No. 13.554 summarizing the 81 Proposals Recommended for Approval as follows:

June 30, 1975

CFDA No. 13.554

Career Education -- Fiscal Year 1975

PROPOSALS RECOMMENDED FOR APPROVAL

Category	No. of Proposals	Funding Recommended
1 -- Activities designed to effect incremental improvements in K-12 career education programs.	45	$ 5,802,756
2 -- Activities designed to demonstrate the most effective methods and techniques in career education in such settings as the senior high school, the community college, and institutions of higher education.	7	918,691

(Continued)

Category	No. of Proposals	Funding Recommended
3 -- Activities designed to demonstrate the most effective methods and techniques in career education for such special segments of the population as handicapped, gifted and talented, minority, low income, and female youth.	12	1,045,364
4 -- Activities designed to demonstrate the most effective methods and techniques for the training and retraining of persons for conducting career education programs.	4	750,298
5 -- Activities designed to communicate career education philosophy, methods, program activities, and evaluation results to career education practitioners and to the general public.	12	1,173,708
6 -- Activities designed to accomplish a survey and assessment of the current status of career education programs, projects, curriculums, and materials in the United States, as required under subsection (3) of Section 406 of Public Law 93-380.	1	308,640
Totals:	81	$ 9,999,457

Average grant size: $123,500

Of particular interest to this study are the following two projects (the only two awarded under category 3 which address themselves to the gifted and talented student), described by the USOE in Career Education Projects Funded Under Section 406, Public Law 93-380 (First Year's Program -- Fiscal Year 1975 Funding), p. 16:

1. Dr. William Cox of Highline School District #40, Seattle, Washington has been granted $52,890 for a project entitled "Career Education for Gifted and Talented".

2. Marshall Sanborn of Research and Guidance Laboratory, University of Wisconsin, Madison, has been awarded $65,917 for a project entitled "Career Education Strategies for Gifted and Talented Boys and Girls".

A third project of interest to this report is that described in category 6. American Institute of Research in Palo Alto, California was awarded the project. This activity was specified by PL 93-380 and requires a report to be made to Congress on the findings.

The above projects began July 1, 1975, and it is expected that each will have a duration of twelve months. The President of the United States has requested Congress to appropriate approximately $10,000,000 for the second year of the above program. These monies have been appropriated.

An article in the October 23, 1975 issue of "Guidepost", published by the APGA, stated that the National Advisory Council on Career Education of the USOE hopes to have appropriated $77 million in additional funds to make Career Education an on-going program. The on-going program would include:

1. retraining counselors in Career Education
2. a state Career Education plan administered by a Career Education director
3. funds for each school district for implementing Career Education
4. funds for training policy making groups
5. funds for Career Education materials.

3. The National Institute of Education

Another program featuring research in Career Education is that of the United States Department of Health, Education and Welfare through the National Institute of Education. According to Dr. Corinne Rieder, Education and Work Task Force Chairperson, in a report for NIE dated May 9, 1975,

> *"The Career Education Program has worked since 1973 to achieve two major goals:*
>
> *1. The first goal of the National Institute of Education's Career Education Program is to improve our understanding of the relationship between education and work.*
>
> *2. The second goal of the Institute's program is to increase the contribution education makes to individuals' abilities to choose, enter and progress in work that is beneficial to themselves and others."* (pp. 15, 16)

To these ends NIE has spent about $45 million on Career Education R and D in FY 1973, FY 1974, and FY 1975. About $40 million of this was used to complete projects transferred from the Office of Education. Dr. Rieder indicates that the FY 1977 submission is the first opportunity to move on those recommendations identified by policy studies and consultations as high priority new projects.

Quoting from the National Institute of Education FY 1976 Program Budget, February 1, 1975:

Accomplishments in FY 1975

The Education and Work program supported activities designed to provide information and tested materials to youth and adults for choosing and progressing in careers. Activities included:

> *Curriculum units and teacher training materials in kindergarten through 12th grade to help improve vocational and technical education have been field tested, revised and are ready for distribution. Appproximately 3,000 children were involved in the field tests.*
>
> *A study of how six school districts planned and implemented a career education program. The findings will be useful in providing planning guidelines for school systems beginning career education programs.*
>
> *The prototype testing of a unique telephone counseling service in Providence, Rhode Island by the Education Development Center (EDC). In its first two years of operation more than 3,600 people who were unemployed and not attending school received information on educational and training resources available to them, how and where to look for jobs and personal counseling. Preliminary information suggests clients are satisfied with the service and do take action based on the counseling they have received.*
>
> *Completion of the development and field testing of career counseling materials designed to help students match their career interests with educational and occupational possibilities. Products, developed at the Appalachian Education Laboratory, include a fifteen unit career exploration curriculum, tested in six sites involving students in grades 8-11, and the Career Information System materials which present in handbook form occupational information useful to high school students. These materials are being field tested in 38 sites in 16 states.*

Twelve percent of the 1976 budget is allocated to the "Education and Work" thrust of the total program. Highlights of the 1976 Budget for this area as listed in the National Institute of Education FY 1976 Program Budget, February 1, 1975 are:

> *Continue four "Experience - Based Career Education" experiments which provide high school students with non-paid learning experiences in a variety of employment settings. ($3.5 million)*
>
> *Initiate a series of approximately 30 five minute TV spots to give children ages 4 to 10 a better understanding of the broad range of careers they might consider. ($0.5 million)*
>
> *Support research on factors influencing career decision-making including the effects of work experiences and environment. ($1.0 million)*
>
> *Conclude the research and development phase of the residential training program for rural families in Glasgow, Montana. (It is expected that future operational support for the Glasgow project will come from another Federal agency.) ($2.7 million)*
>
> *Note: The decrease in funding for Education and Work in FY 1976 reflects the completion of the research and development phase of two existing projects: the Mountain Plains project in Glasgow, and an adult counseling demonstration program.*

The programs for the coming fiscal year are summed up in this way:

> *In the coming fiscal year, NIE Programs will be expanding efforts to give young people firm information or actual experience in the many careers open to them; to try-out alternative ways of training and counseling dropouts or potential dropouts; and to give high school students a variety of actual career experiences with businesses in the local community. Other NIE programs will provide Federal, State, and local educators with the best information available about ways to establish such programs for students of all ages; about the types of specific skills needed for different occupations; and about the relationship between education and career success.*

Looking ahead in Education and Work Task Force -- FY 1977 Program Plan. Dr. Reider lists four problems and strategies for dealing with them.

Sub-problem 1: Many people lack information and career counseling services which could help them make better educational and occupational decisions. ($4.0 million)

Strategies:

1. determine the causes of poor career decision-making and improve assessment of occupational information, career-decision-making skills and goodness of career decisions

2. learn how to reduce early socialization into restricted occupational choices in girls and women

3. find out how to expand and improve career counseling and career information services to inform policymakers about the relative costs, feasibility and payoff of different approaches.

Sub-problem 2: *Lack of opportunity for in-depth investigation and exploration of what different kinds of work are like, an opportunity which would help improve career decisions, particularly high school plans, post-high school plans, and decisions regarding continuing education.*

($5.3 million)

Strategies:

4. discover how to expand and improve career exploration opportunities for junior high school students

5. learn how to expand and improve career exploration opportunities for senior high school students

6. develop ways to help post-secondary students explore different occupations before they make major educational decisions.

Sub-problem 3: *What should schools teach to prepare students for careers, avoiding the problems of overly narrow and of overly broad or irrelevant preparation? While there is considerable agreement that one purpose of education is to help prepare people for work, there is considerable disagreement on what kind of preparation is needed in a time of rapid occupational change.*

Strategies:

7. Establish ways of conceptualizing occupational requirements and educational programs that will be most useful in identifying what schools should teach to prepare students for careers.

8. Determine the feasibility, costs and effectivenesses of different approaches to educational planning for career preparation.

9. *Improve what educational institutions can do to certify occupational competencies in ways that are both non-discriminatory and relevant to occupational performance.*

10. *Learn how schools can increase educational equity in career preparation of women.*

Sub-problem 4: Life-long access to education for career development is needed. How to finance such access, or the conditions under which financial plans will and will not be used by their intended beneficiaries is uncertain.

Strategy:

11. *Determine what levels of assistance, eligibility requirements and other conditions for use of financial support for continuing education for adults between 25 and 55 years of age will result in high levels of participation and completion, when financial assistance is provided (a) through public sector mechanisms and (b) through the private sector.*

December 12, 1975
Man-Technology: Career Projects
2150 Shattuck Avenue, Suite 903
Berkeley, California 94704